

User's Manual

Retail Smart MP-2410

10.4" Compact Integration Fanless POS system



Version 1.0

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Safety and Warranty

1. Read these safety instructions carefully.
2. Keep this user's manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Do not use liquid or spray detergents for cleaning. Use a damp cloth.
4. For pluggable equipment, the power outlet must be installed near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall could cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Retail Smart (MP2410) applies **24V 120W/180W DC Power Adaptor**. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient over-voltage.
12. Never pour any liquid into an opening. This could cause fire or electrical shock.
13. Never open the equipment. For safety reasons, only qualified service personnel should open the equipment.
14. If any of the following situations arises, get the equipment checked by service personnel :
 - a. The power cord or plug is damaged.
 - b. Liquid has penetrated into the equipment.
 - c. The equipment has been exposed to moisture.
 - d. The equipment does not work well, or you cannot get it to work according to the user manual.
 - e. The equipment has been dropped and damaged.
 - f. The equipment has obvious signs of breakage.
15. DO NOT LEAVE THIS EQUIPMENT IN AN UNCONTROLLED ENVIRONMENT WHERE THE STORAGE TEMPERATURE IS BELOW -20° C (-4°F) OR ABOVE 60° C (140° F). IT MAY DAMAGE THE EQUIPME

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About this Manual

This manual contains all the information you need to set up and use Retail Smart.

- Chapter 1** Provides an introduction to Retail Smart and this manual.
- Chapter 2** Provides all necessary information for all hardware setup.
- Chapter 3** Provides the necessary information for installing for chipset and its accessories.
- Chapter 4** Lists all Retail Smart specifications include optional second I/O.
- Chapter 5** Troubleshooting of Retail Smart

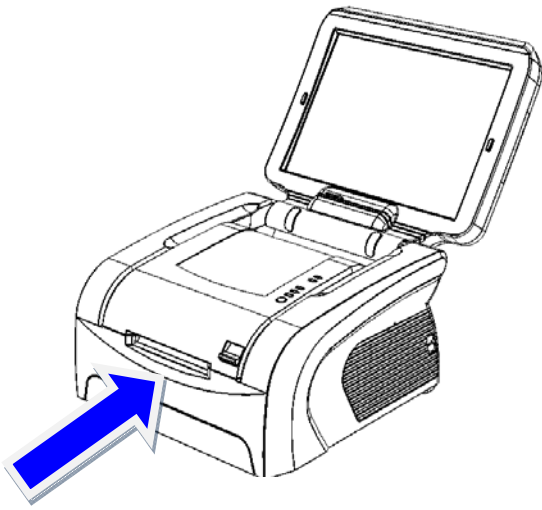
CHAPTER 1

Introduction

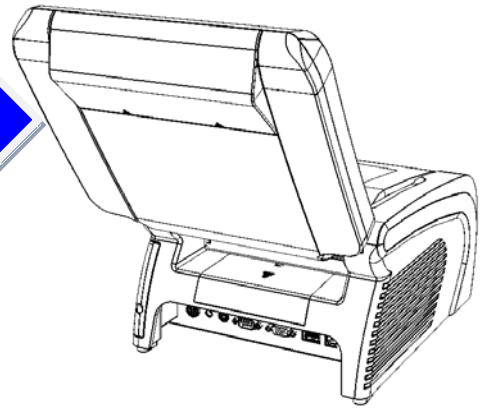
Retail Smart Characteristics

Retail Smart is a dual core mobile POS and all-in-one fan-less POS system of FIRICH ENTERPRISES CO., LTD. The extensible, robust and fan-less design makes it a perfect solution for retail and hospitality market.

- **System:** A high speed fan-less processor enables to process a high capacity of data efficiently.
- **Housing:** The solid aluminum housing dissipates the heat inside the system and makes it a perfect fan-less solution; additionally it also assures the compliance to EMI radiation testing.
- **Compact:** Integrated with different peripherals
- **Display:** The LCD display can be tilted at multiple angles for operator ease of use.
- **Extensibility:** There are five optional second I/O that customer can choose by their requirement. In addition to, the VESA mount can be others transforming of this system.

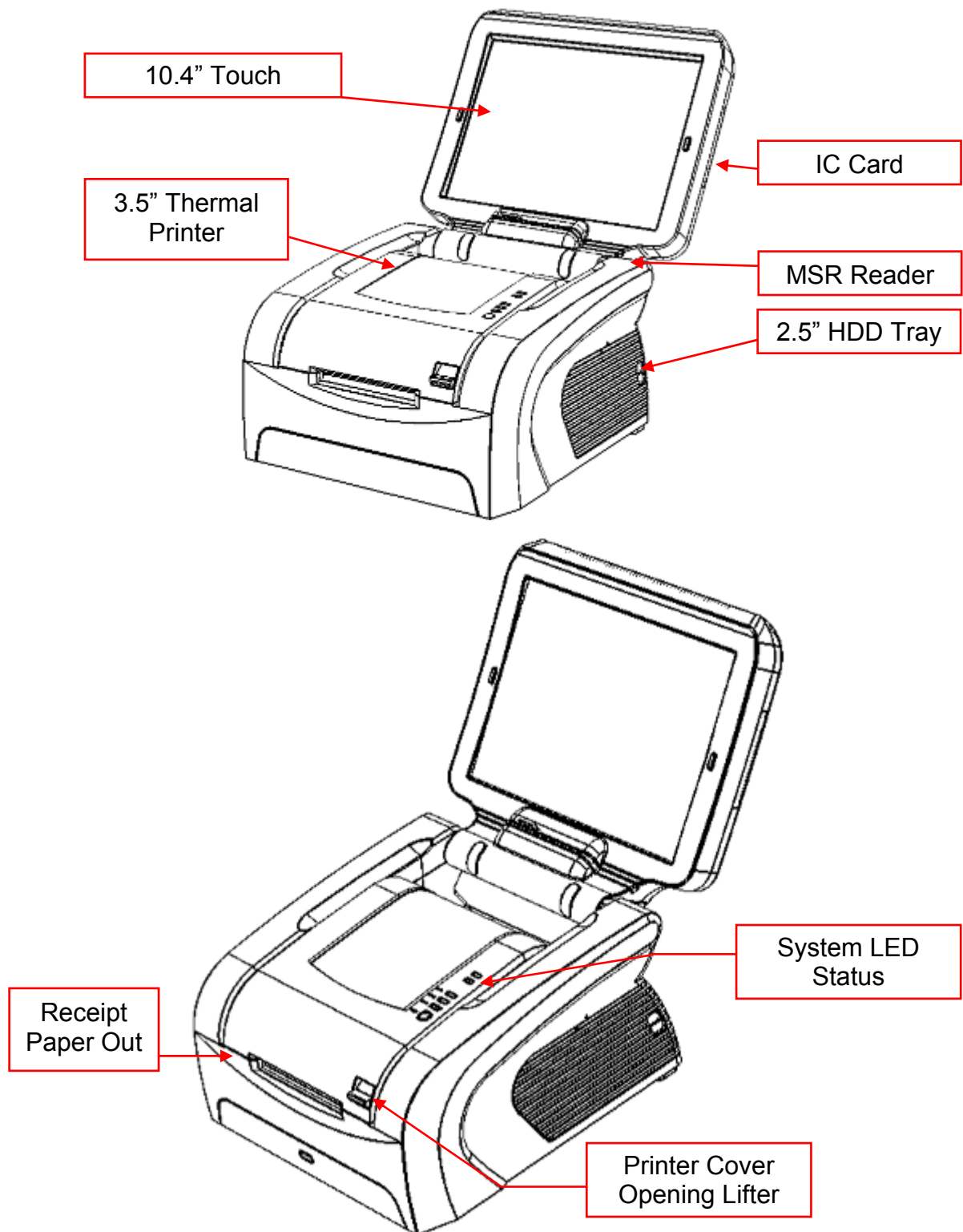


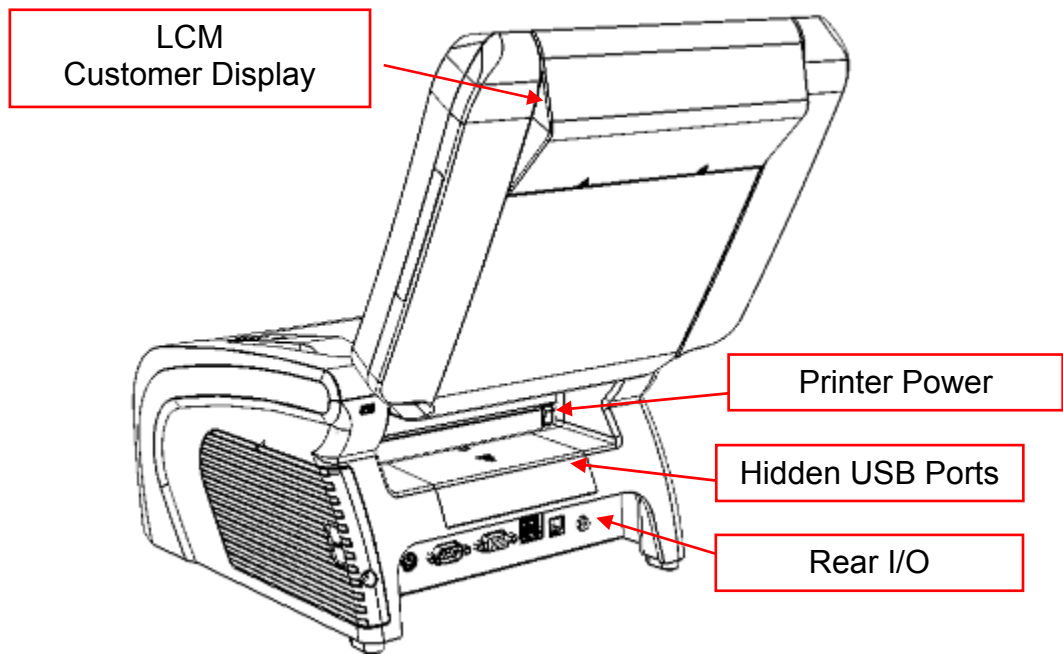
**Retail Smart With
Thermal Printer**



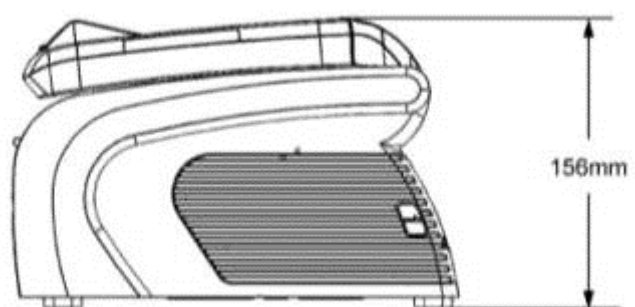
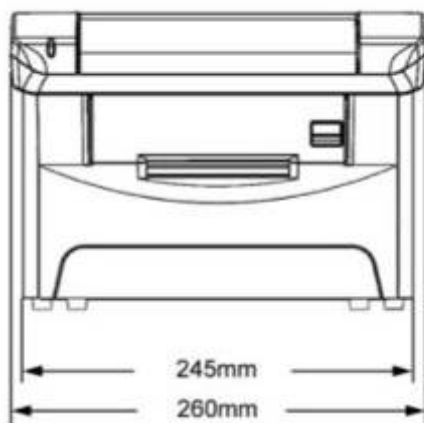
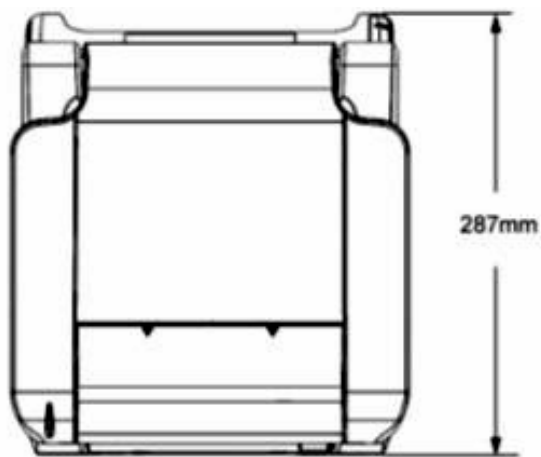
Retail Smart with LCM

A Quick Tour of Retail Smart

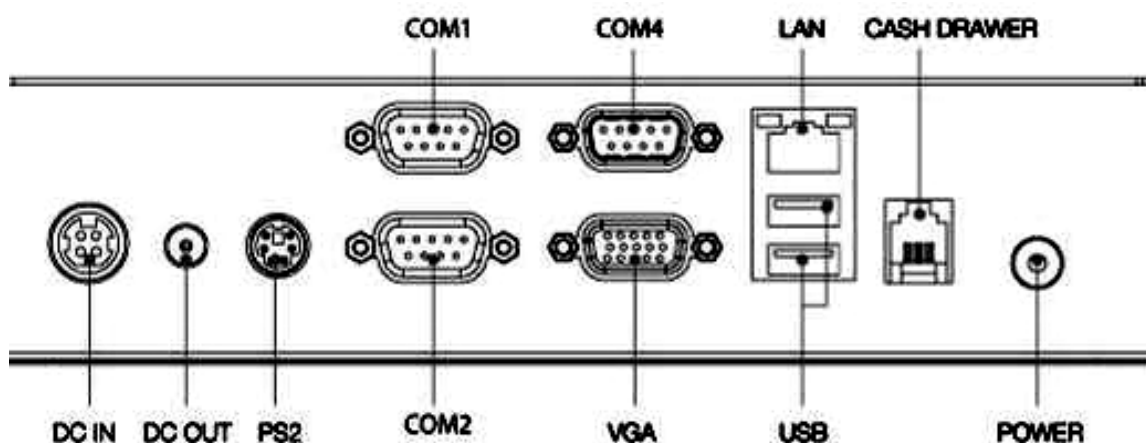





Retail Smart Dimension



Rear I/O Panel (with 5 types of Second IO board)



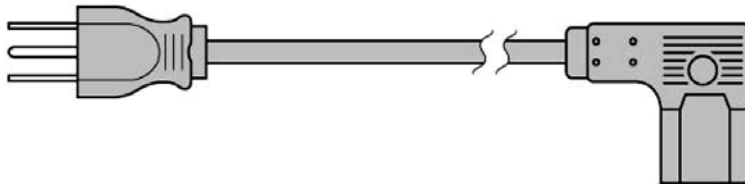
I/O Port	Connector Type	Description
	24V DC-In	Connect the 24V power adaptor to this port
DC OUT	12V DC-Out	This DC-out port can power the monitor or any other peripheral or device which need 12V DC power input.
PS/2	PS/2	Supports general Programmable Key Board, PC KeyBoard, Mouse or standalone MSR devices
COM 1 COM 2 COM 4	D-sub 9	The RS-232 COM 1, 2 & 4 can support RI / 5V / 12V and also be used to connect peripherals and devices.
VGA	D-Sub15	The VGA port is used for connecting the 2 nd monitors
LAN	RJ-45	GigaLAN to Ethernet
USB	USB type A	Standard USB connector for external device
Cash Drawer	RJ11 connector	Cash Drawer Connector, 12 V actuation support
Power	Power Switch	System power switch

Packaging List

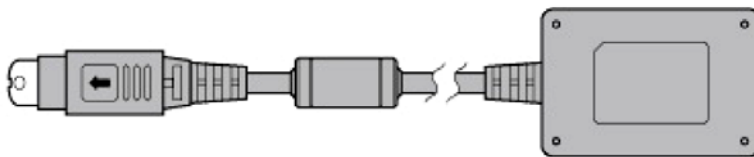
- Retail Smart Main System and pedestal integrated with 24V-120w Power adaptor



- AC power cord



- 24V DC 12W Power Adaptor



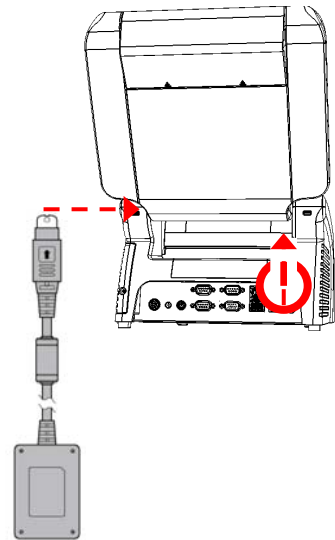
CHAPTER 2

Hardware Setup

Retail Smart Power On

Please make sure that the system power is turned off and the **24V** power supply is disconnected to the Retail Smart when making any hardware changes to Retail Smart.

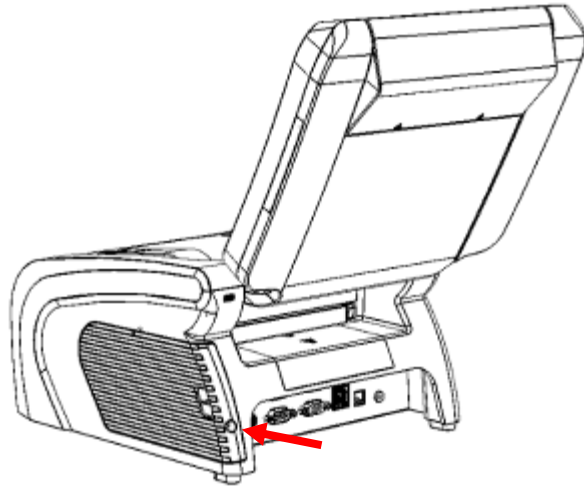
1. Plug the **24V** DC power adaptor in
2. Make sure every device or peripherals are well connected before switch on the System.



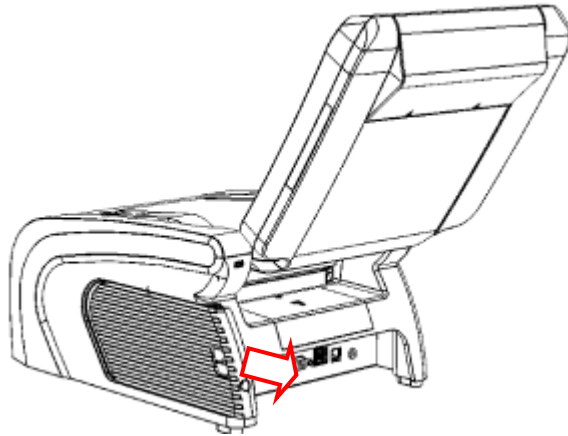
2.5" Hard Disk Drive (SSD) Installation

1. Turn off power and remove power cord from the system

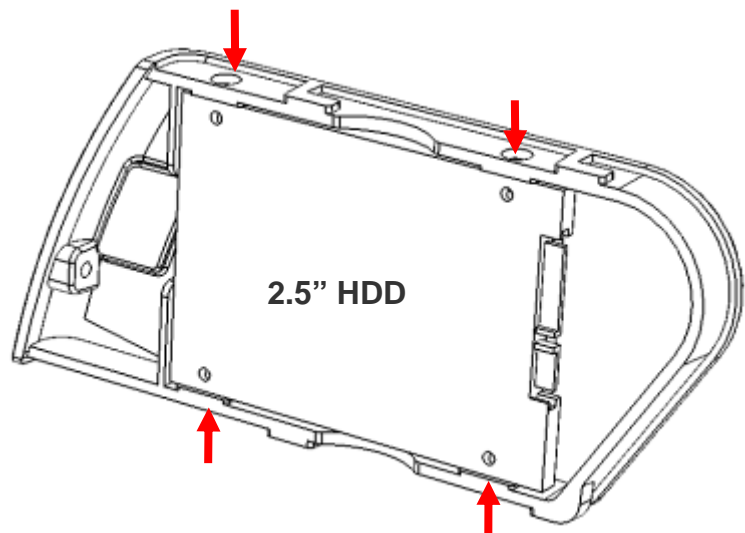
2. Unscrew the maintenance door at the rear side of the unit



3. Remove the HDD Tray and take it off



4. Remove the screws from the both sides of HDD



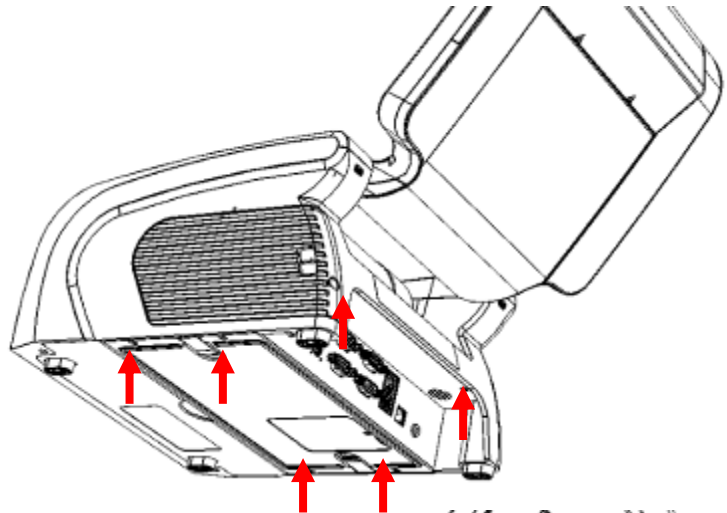
5. Restore the HDD Tray to back to the system.

6. Fix the HDD Tray with the screw.

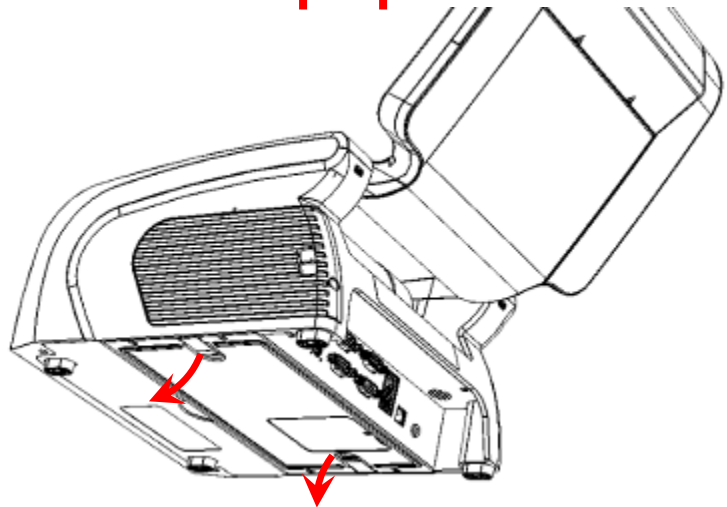


Memory (DDRII) , DOM Installation

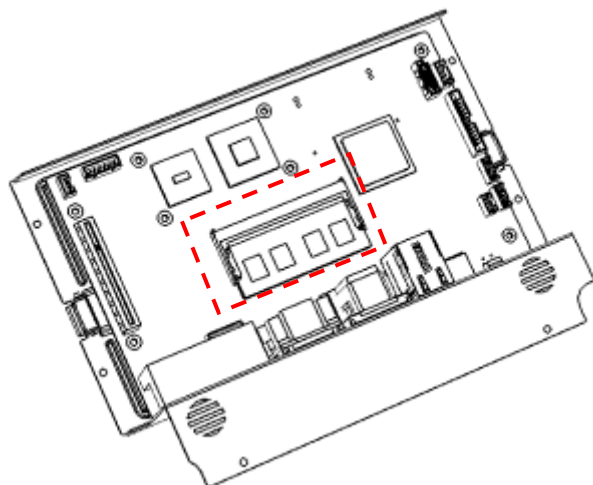
1. Unscrew and remove Main Board Module



2. lift two bars at the both sides of MB module



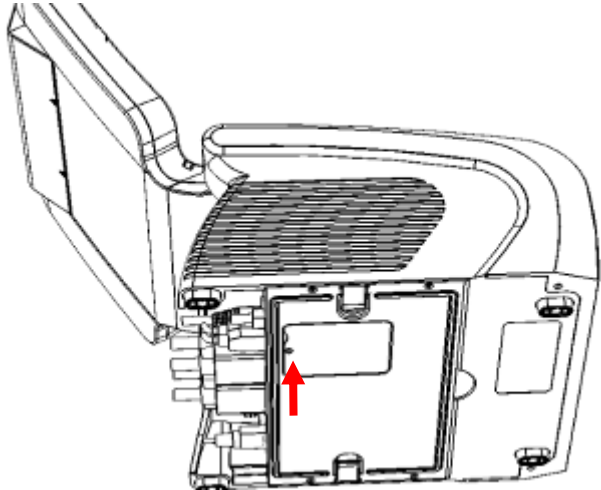
3. Install the DDRII RAM or CPU you require



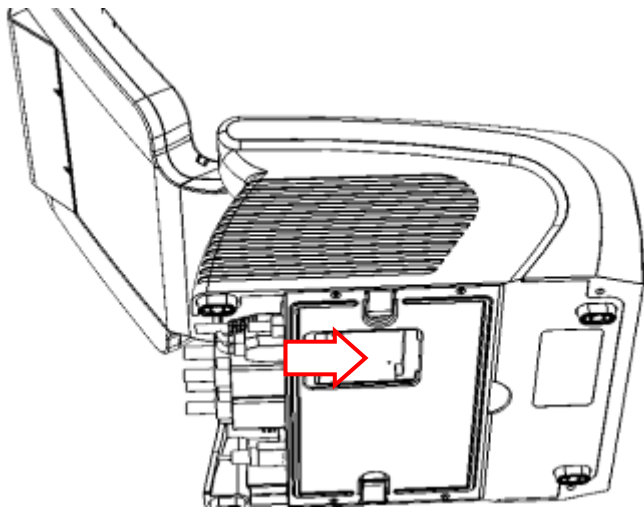
4. Restore the Main board Unit Back (please ensure the Thermal Pad is still on the right place)

Compact Flash Installation & COM port Jumper Selection

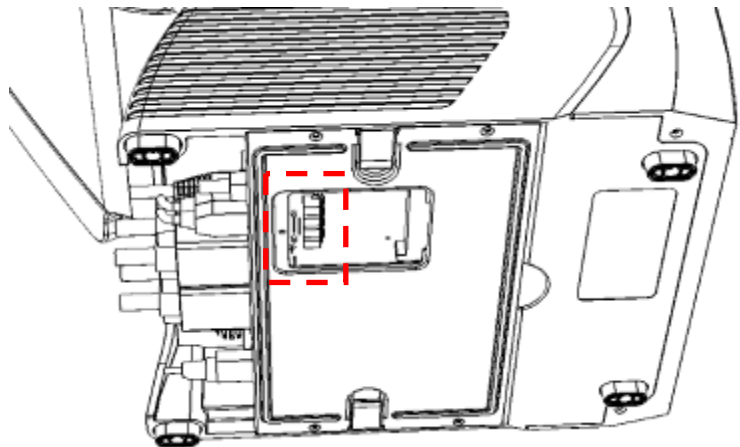
1. Unscrew and remove the maintenance bracket



2. Slot the CF in



3. Select jumper setting for RS-232 powered options; please follow the instruction on the back side of bracket
4. According to the COM port setting, please refer to the M/B manual

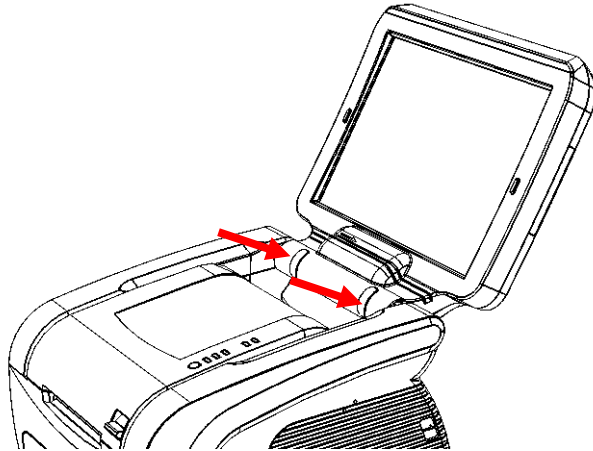


5. Install the CF you require or selected the proper RS-232 jumper settings
6. Restore the maintenance bracket

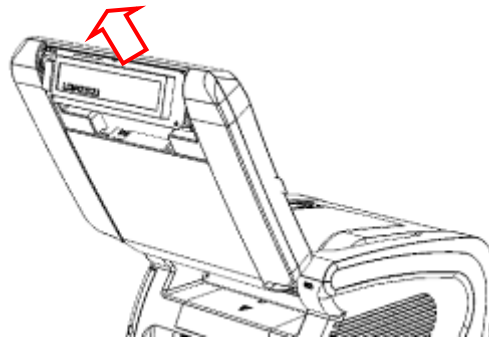
Magnetic Card Reader Installation

1. Turn off power and remove power cord from the system

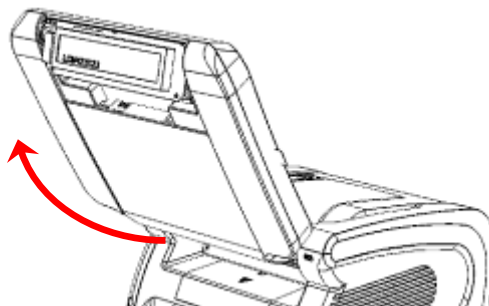
2. Unscrew the 2 screws of front panel



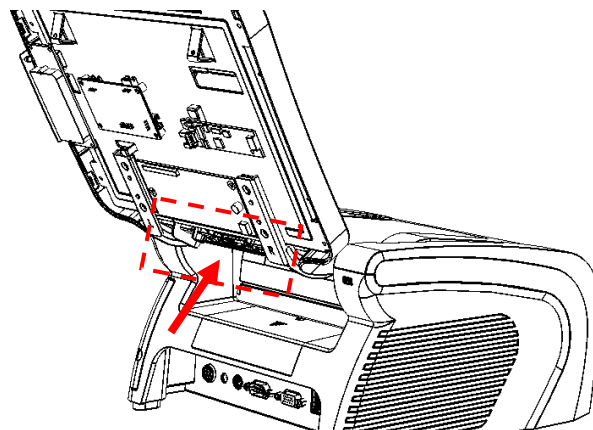
3. Make Sure the LCM Cover is removed



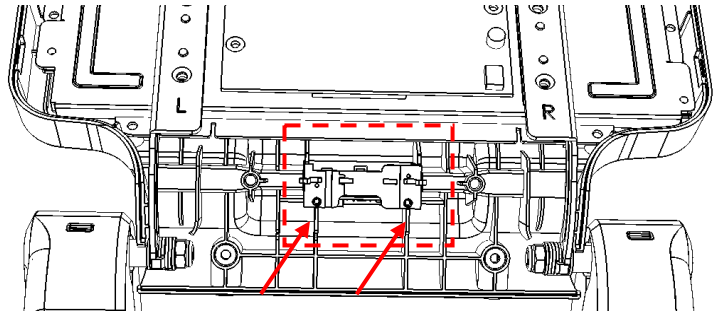
4. Remove Back Cover of Display



5. Prepare a MCR Module



6. Fasten 2 Screws and connect one MSR Cable (USB interface) with MSR Module



7. Cover the Back cover back and Fasten 2 screws, and re-install the LCM Cover

8. This option is for users who need to customize the MCR configurations for a particular task. To enter the Configuration Mode, please execute text editor program (such as Microsoft Word, Notepad...etc.) first, and then press [Ctrl] + [Alt] + [F10]. The following menu will appear accordingly.

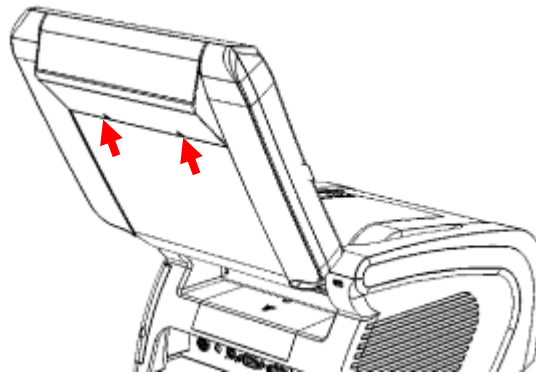
```
**** CONFIGURATION MODE ****  
  
1:SET INTERFACE  
2:SET MAGNETIC STRING  
3:SET STRING EDITING  
4:SET BUZZER  
5:RESET TO DEFAULT  
6:SHOW STATUS  
7:SET KEYBOARD CONFIGURATION  
0:EXIT SETUP MODE
```

For detailed instruction, please refer to the MSR212 Programmer's Manual

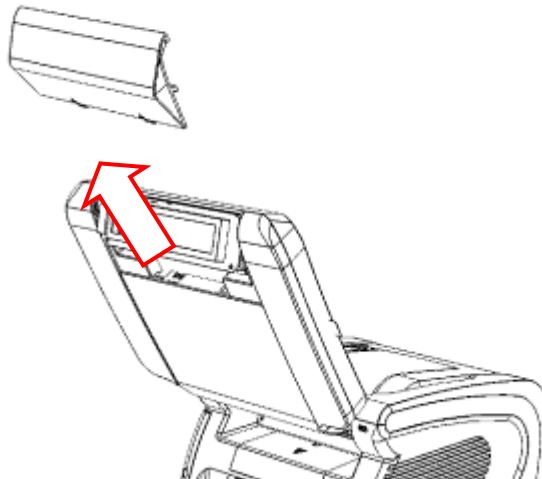
Note: If the MCR does not work normally, please refer to [troubleshooting](#).

Integrated LCM Installation

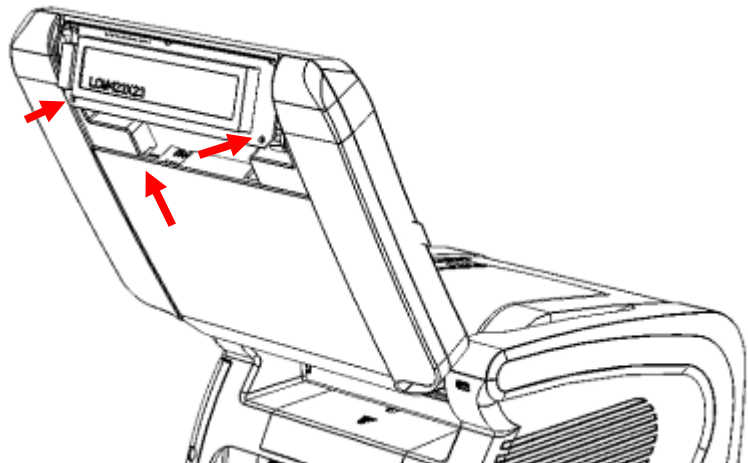
1. Remove the plastic cover on the cable cover



2. Fix the pole stand with screws and place the pole-type customer display to the stand



3. Remove two screws to install or replace the LCM

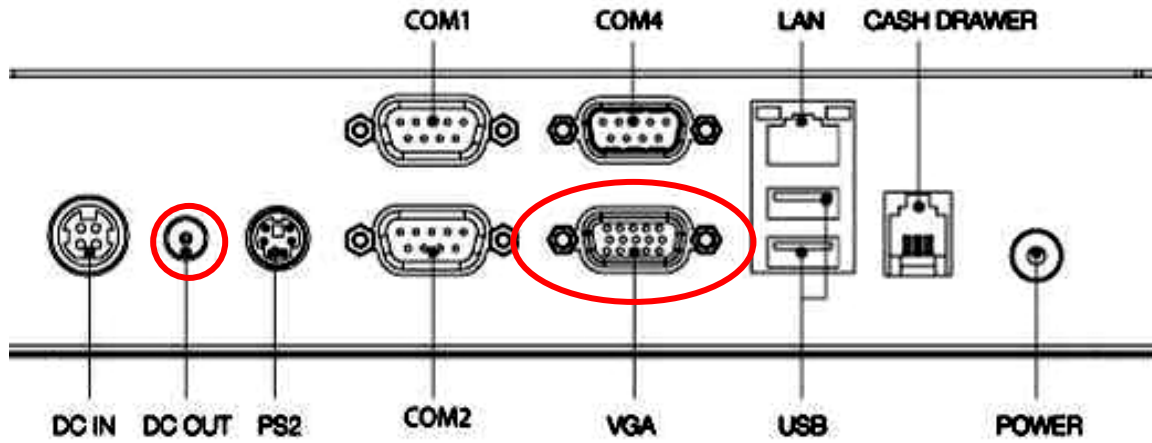


4. Connect the RS-232 (1x4 pins) cable to the system.

Note: If the LCM does not display correctly after an application is loaded, please refer to [troubleshooting](#).

Second Display Installation

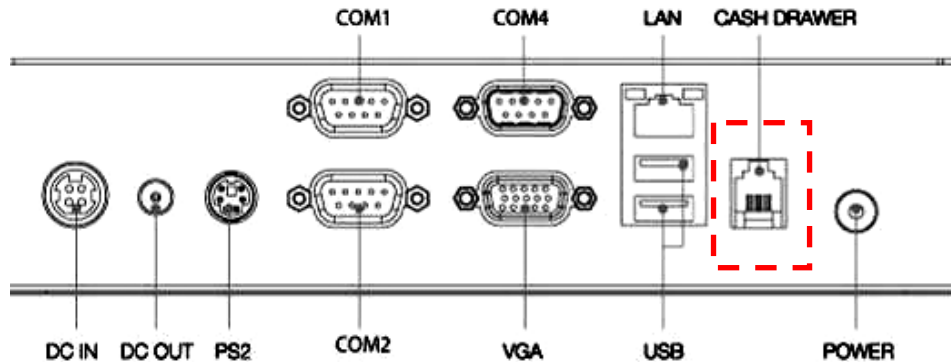
1. Turn off system power.
2. Connect the VGA cable to VGA connector and the DC in cable connect to 12V out.
3. Turn on OSD switch power on and turn on system power.



Cash Drawer Installation

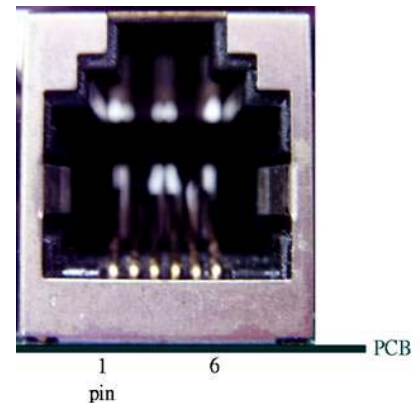
Before connecting the cash drawer to the **MP-2410**, please make sure the drive voltage and cable pin assignment of the cash drawer matches the definition of the cash drawer port of **MP-2410**. Please refer to the mother board (BT-05) manual GPIO part for more information. For programmers, please refer to the **Cash Drawer Driver**, where you may find the test programs and DLL Library files for your application.

Plug cash drawer cable into the cash drawer port.



Note: If the cash drawer cannot be detected by the system, please refer to [troubleshooting](#).

Cash_Drawer1: DIO with RJ-11 Connector	
PIN No.	Signal Description
1	Ground
2	DIO Out 1
3	+12V
4	DIO IN 0
5	DIO Out 0
6	Ground



Up to two cash drawers may be driven from this port. Driving voltage of the solenoid is DC+12V. I/O port 2F is used for drawer operation. A test program is supplied, for Linux and Windows, source code of which is available on request by software developers.

Value	Description
0x01	GPIO:1, DIO:0
0x2e,0x87,0x2e,0x87,0x2e,0x07,0x2f,0x09,0x2e,0xf1	Entry commands.
0x2f,0x00	Output address.
0x2f,0x00	Input address.
0x53	Open cashdrawer1 value.
0x33	Open cashdrawer2 value.
0x60	Close cash-drawer value.
0x80	Cash-drawer status mask.

CMOS definition for cash drawer

Test Example:

IO space 0x70 (bank 1).

Reserve IO space in bank2 A0.

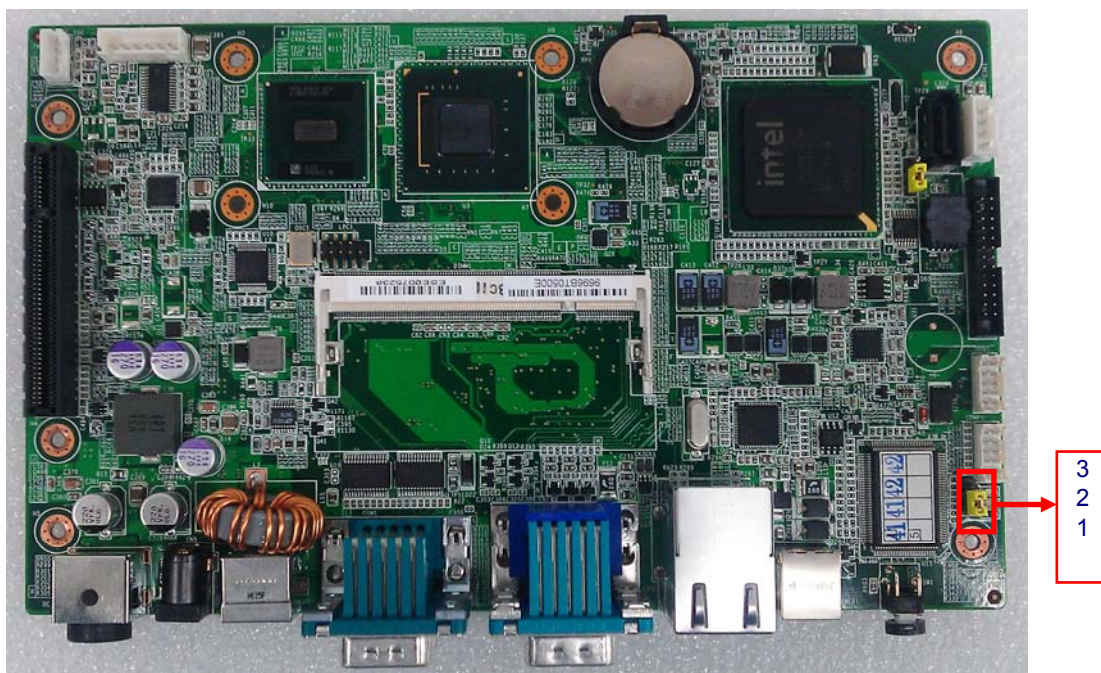
0x37 : 0x72

0x38 : 0xA0

Reserve space.	Value.	Explain.
A0	0x01	GPIO:1, DIO:0
A1 – B4	0x2e,0x01,0x87,0x01,0x2e,0x01,0x87,0x01, 0x2e,0x01,0x07,0x01,0x2f,0x01,0x09,0x01, 0x2e,0x01,0xf1	Entry commands.
B5 – B6	0x2f,0x00	Output address.
B7 – B8	0x2f,0x00	Input address.
B9	0x53	Open cashdrawer1 value.
BA	0x33	Open cashdrawer2 value.
BB	0x60	Close cash-drawer value.
BC	0x80	Cash-drawer status mask.

12V / 24V Power Select for cash drawer

Please adjust the jumper setting of MianBoard top side, JP7(as following picture blocked in red) from (1,2) to (2,3); (1,2) is support 12V; (2,3) is support 24V

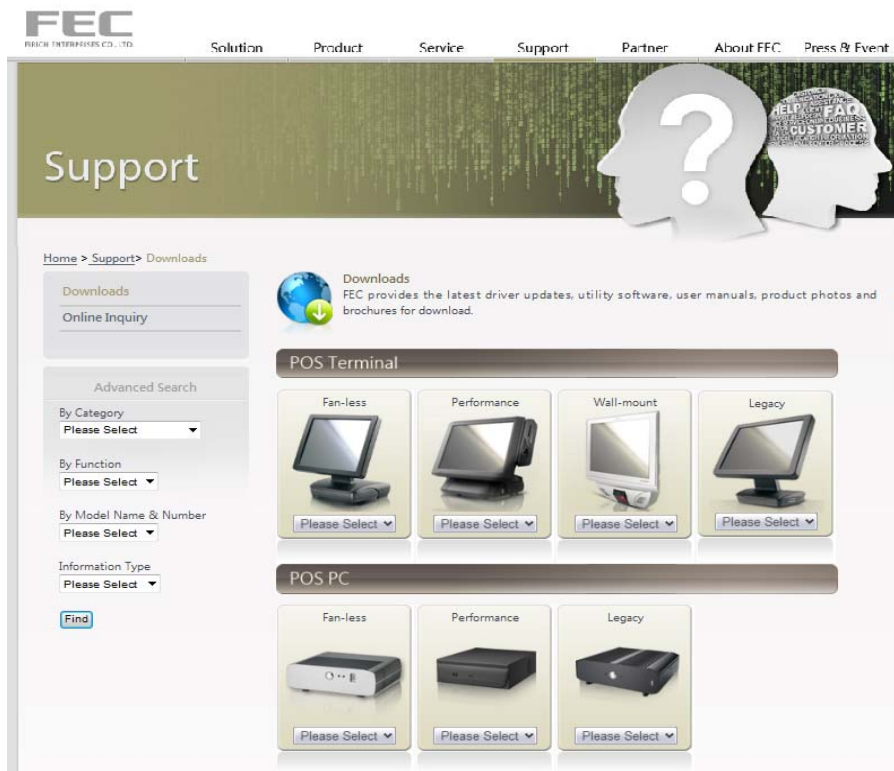


CHAPTER 3

Software Installation

Driver Download from FEC Website

A: Please go to FEC website and download MP-2410 driver.



B: The installation sequence:

Chipset Driver -> VGA Driver -> LAN Driver -> Audio Driver -> Touch Driver -> Other Driver (optional)

C: Then, you can start to install.

Please follow this installation sequence accordingly.

Intel Chipset Driver Installation for Windows XP

Step 1. Please double confirm the Intel chipset driver from website.

Step 2. Click Next



Step 3. Read the License Agreement and click “Yes” to continue



Step 4. Click “Next” to continue



Step 5. Click “Next” to continue



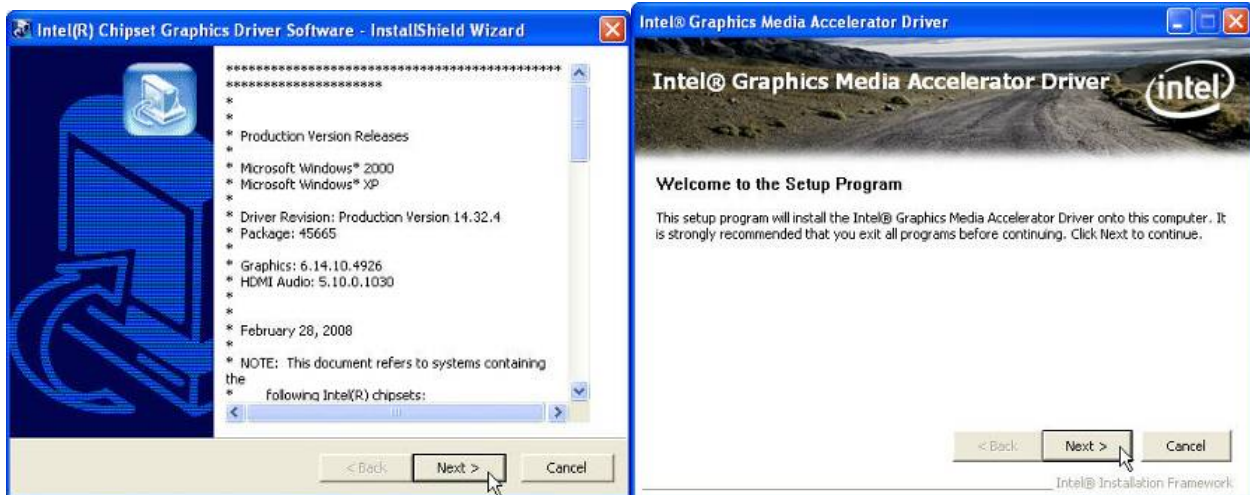
Step 6. Click “Finish” to complete setup



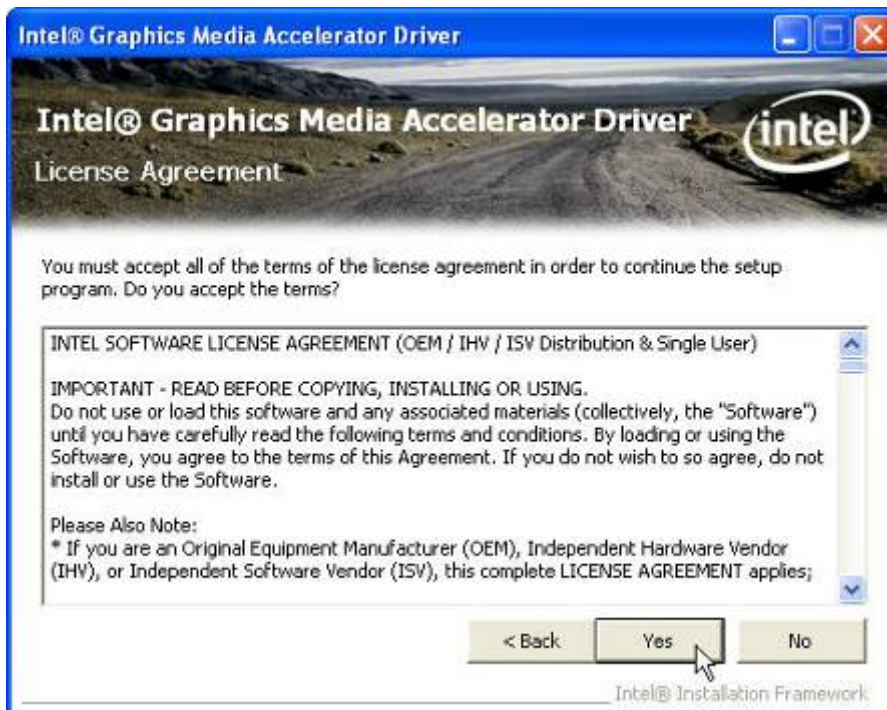
VGA Driver Installation

Step 1. Please double confirm the VGA driver from website

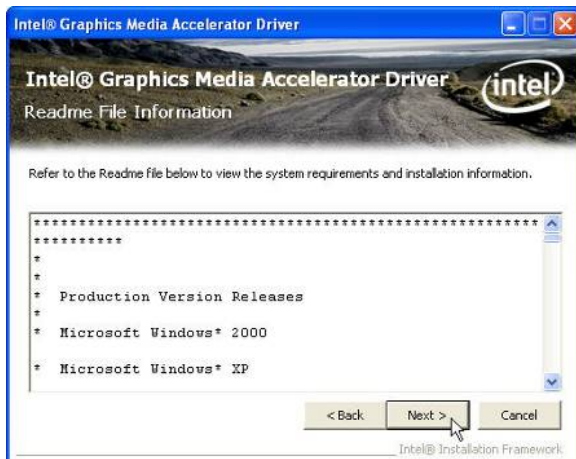
Step 2. Click “Next” to continue



Step 3. Read the License Agreement and click “Yes” to continue



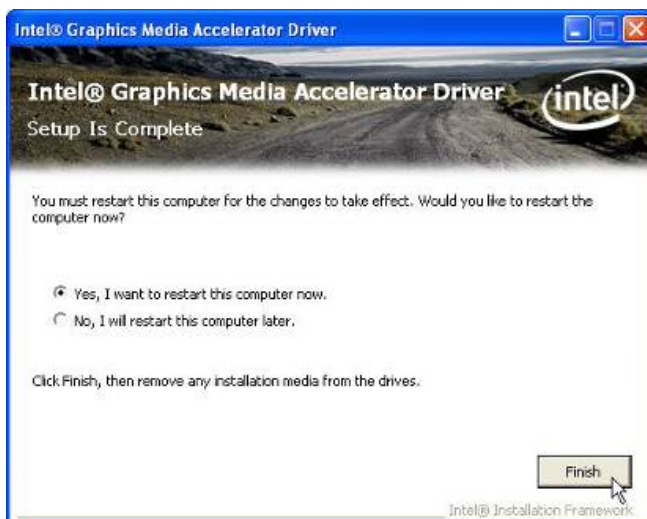
Step 4. Click “Next” to continue



Step 5. Click “Next” to continue



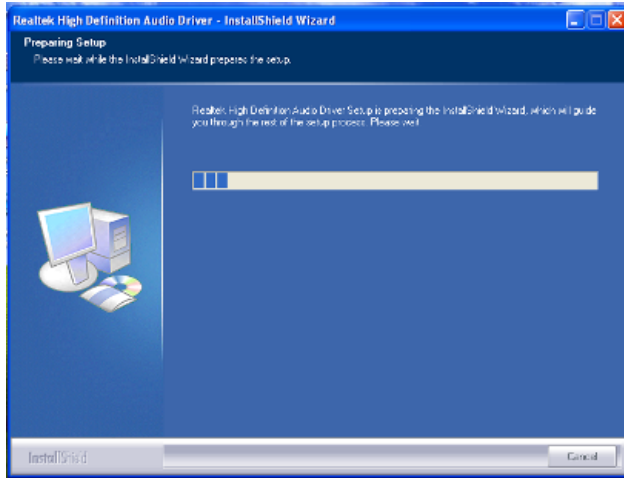
Step 6. Click “Finish” to complete setup



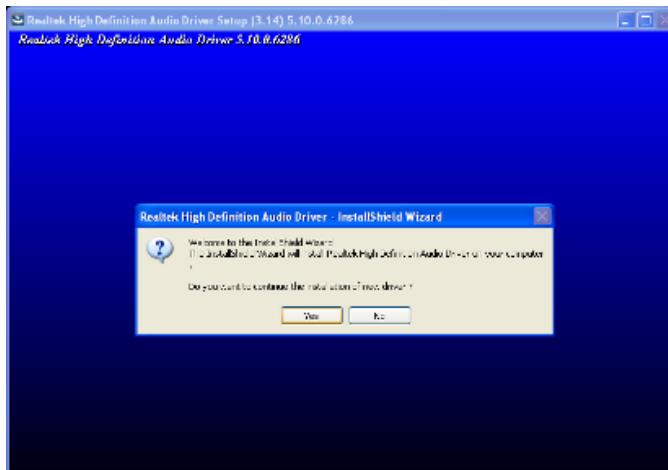
Audio Driver Installation

Step 1. Please double confirm the Audio driver from website.

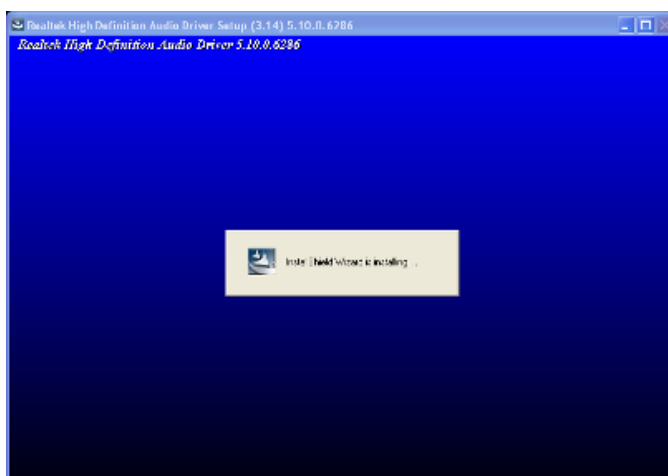
Step 2. Click “Next” to continue



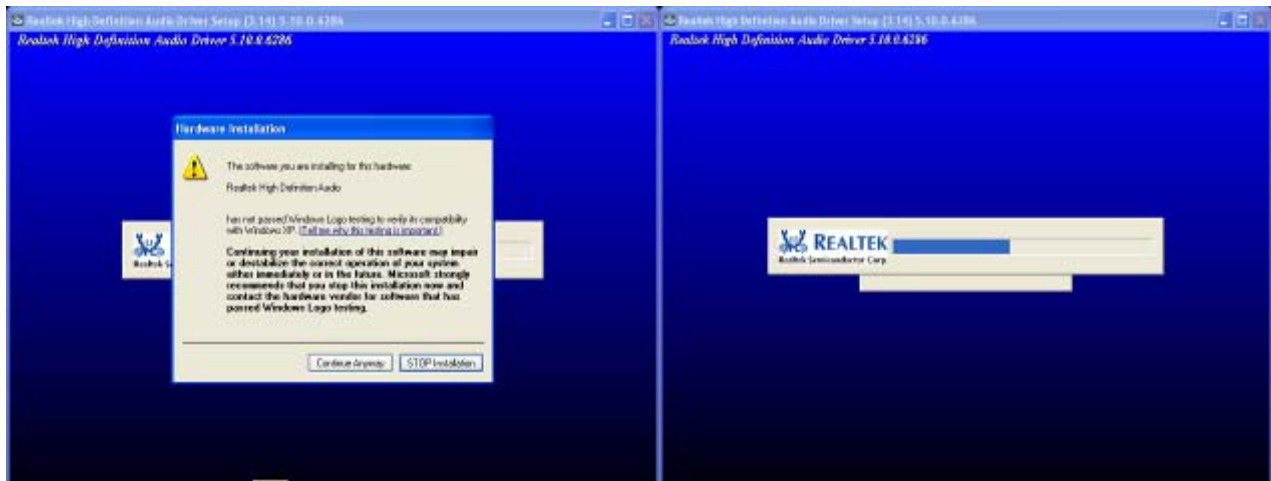
Step 3. Double click **Setup.exe**.



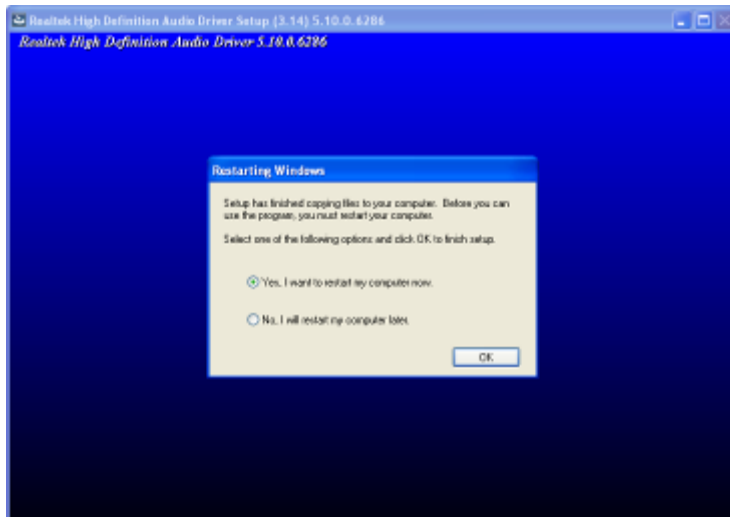
Step 4. Click **Next** to continue.



Step 5. Click **Continue** to process the installation.



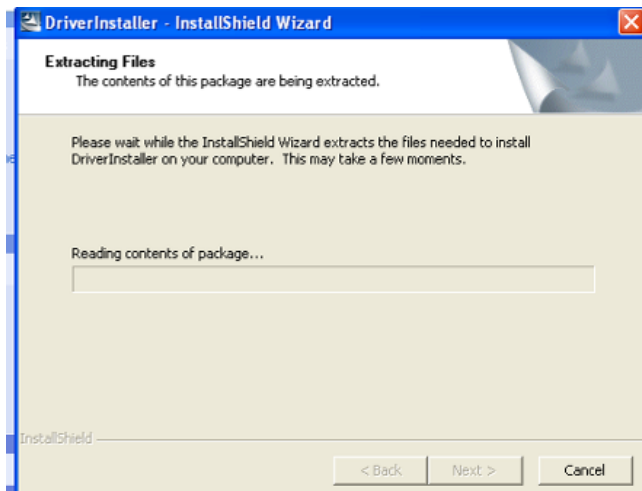
Step 6. Choose **YES**, click **OK** to finishing the installation and restart the system.



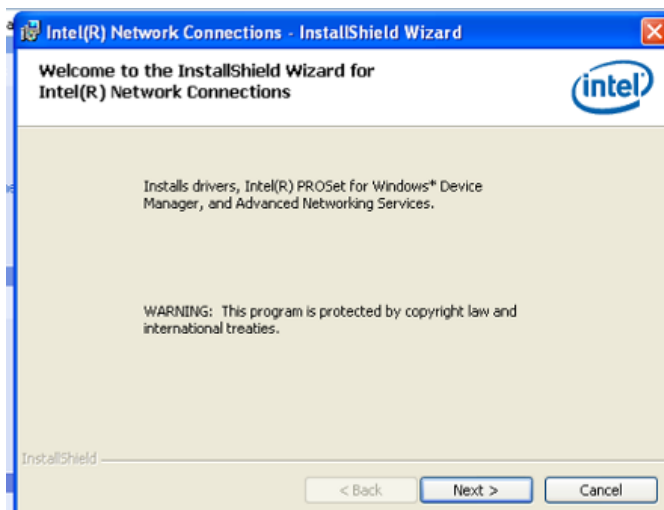
Lan Driver Installation

Step 1. Please double confirm the LAN driver from website.

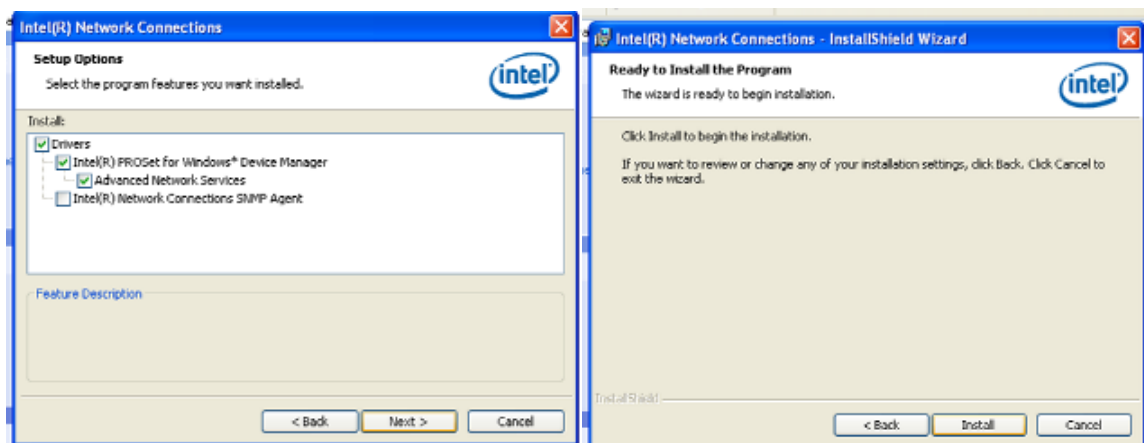
Step 2. Click “Next” to continue



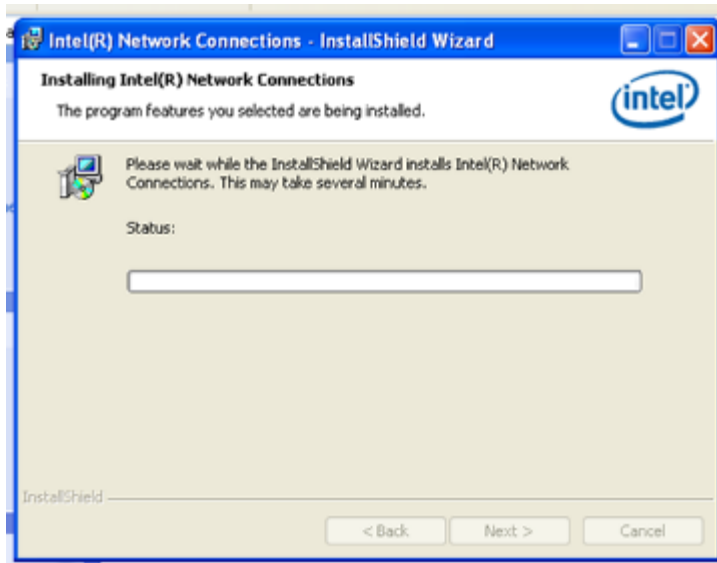
Step 3. Click “Next” to continue



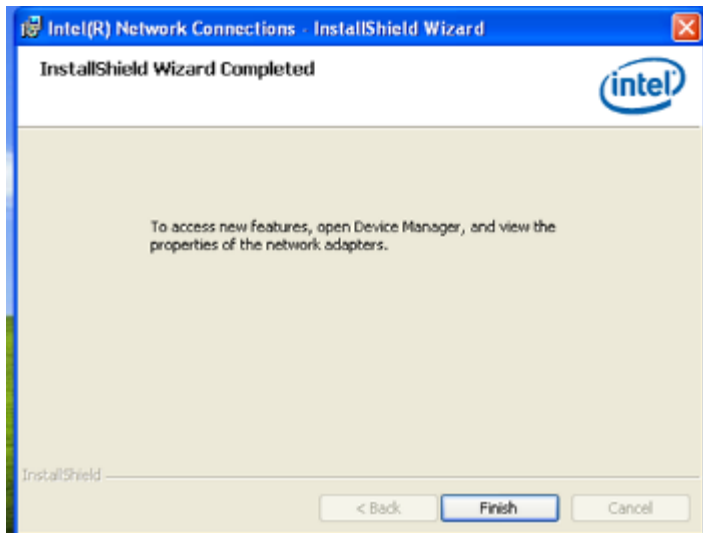
Step 4. Click “Finish” to complete setup



Step 5. Please wait while processing.



Step 6. Click **Finish** to complete the installation procedure.



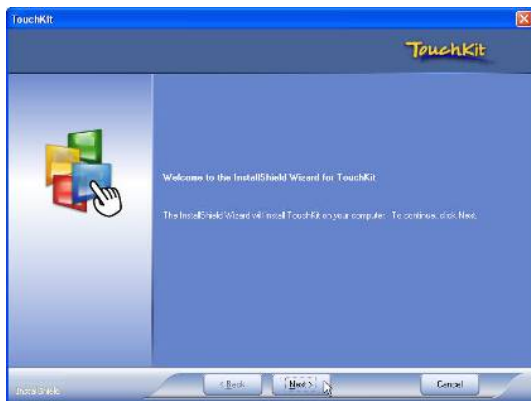
EETI Touch Tools Installation

EETI Touch Tools Installation for Windows XP/ Windows Vista/ Windows 7

Step 1. Locate **D:\Utility\TouchScreen\TouchKit\Windows 2000 XP**

Step 2. Select the relevant folder for the operating system that you are using.

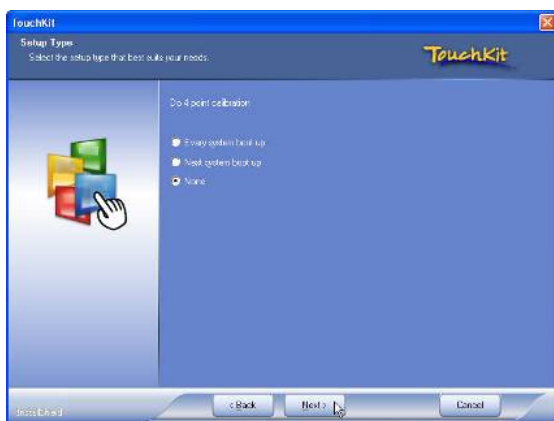
Step 3. Open **Setup.exe**



Step 4. Click **Next**



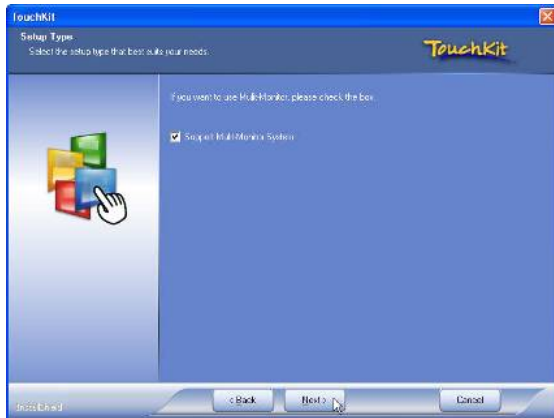
Step 5. Click **Next**



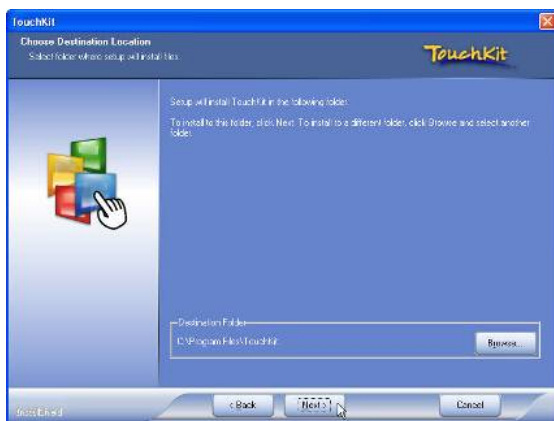
Step 6. Click Next



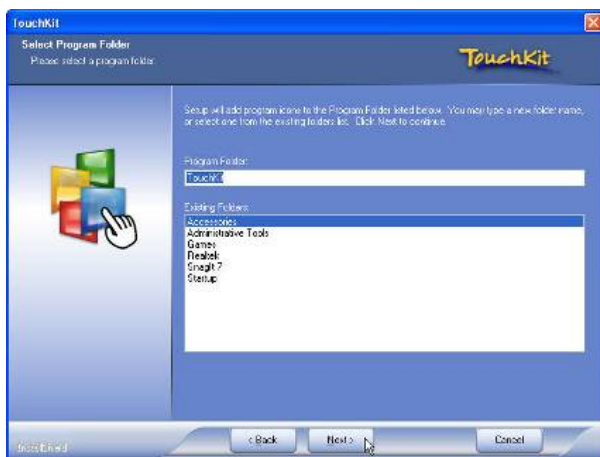
Step 7. Click OK to close the pop-up dialog.



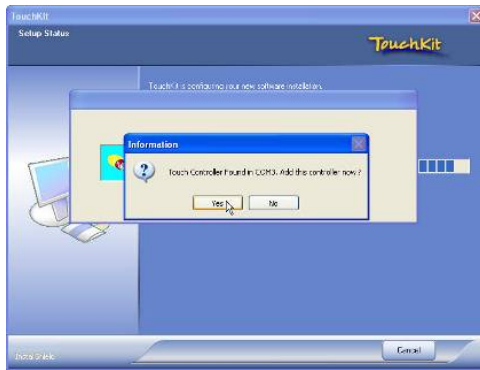
Step 8. Click "Support Multi-Monitor System" and then Next to continue.



Step 9. Click Next



Step 10. Click Yes



Step 11. Click OK and turn off the computer to restart your system again.

After the system finish rebooting follow the directions to calibrate the Touch screen.



EETI Control Panel

This section explains the different options in the TouchKit control Panel.

General tab

The general tab allows you to:

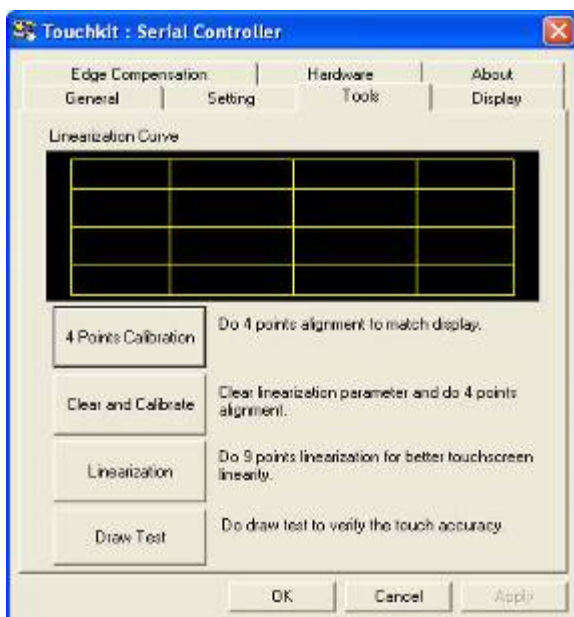
- Manage the touch screen controller you installed.



Tools tab

The tools tab allows you to:

- Calibrate the touch screen with the **4 Points Calibration** button.



CHAPTER 4

Specifications

Retail Smart Specifications



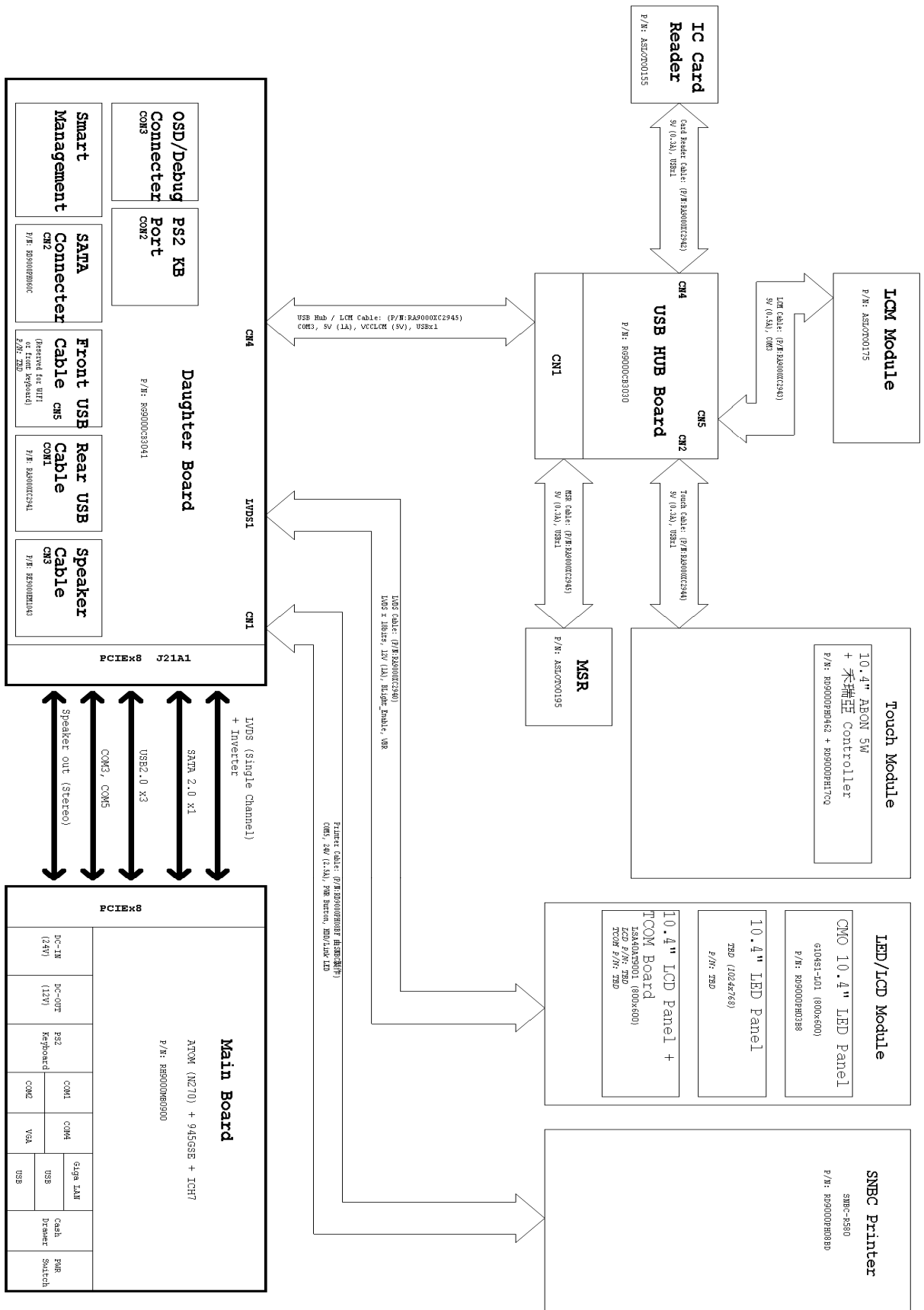
Main Specifications	Chipset	Intel 945GSE / ICH7M
	Processor	Intel® Atom N270 1.6Ghz
	System Memory	Up to 2GB DDR2 SDRAM on 1 x SODIMM
	Power Supply	24V – 120W / 180W Power Adapter
	Storage Device	1 x 2.5" SATA Storage (HDD / SDD) / 1 x CFII
	Construction	Aluminum Metal Housing + Plastic Cover
	Housing Color	Greece White / Black
Display	LCD Size	10.4" (4:3)
	Input Interface	TTL / LVDS
	Max Resolution	VGA 800 x 600 / XVGA 1024 x 768
	Brightness	300 cd/m ² LED Backlight

	Viewing Angle	H160 / V140
	Backlight MTBF	10K / 30K hours
	Touch Screen	5-Wire Resistive Touch
Built-in Components	Speakers	2W x 2
	MSR	MCR Single / Dual / Triple Track
	IC Card Reader	Available USB Interface
	LCM	LCM Module (192 x 32 / 20 x 2)
Storage Device	HDD Bay	1 x 2.5" HDD / SSD swappable
	CF II Slot	1 x CF II Available
	SATA DOM	1 x SATA DOM (Optional)

Thermal Printer Specifications

Thermal Printer RS-T80	
Thermal head size	3.5" / 2.5" Thermal Head available
Paper Roll capacity	General ϕ 80mm diameter paper roll
	Maximum ϕ 100mm diameter paper roll
Printer Head Lifetime	>150KM
Optical Sensor	Near End; Paper End; Black Mark
Interface	RS-232
Printing Speed	Maximum 230mm/s
Paper Cut	Tear off, Full cut, Partial cut
Cutter LifeTime	2 million times
Paper load	Easy loading design
Power Consumption	24V DC / Maximum 2.3A
Thermal head size	3.5" / 2.5" Thermal Head available

Retail Smart Block Diagram Definition



CHAPTER 5

Troubleshooting

Please note that the following troubleshooting guide is designed for people with strong computer hardware knowledge such as System Administrators and Engineers.

Touch Panel does not Work

- A) Check if the touch driver has been properly installed. Or try to reinstall again (Please refer to the touch driver installation).
- B) Move back cover, check all relative cables for touch controller.
- C) If touch controller does not appear green light, it could be defective.

Touch Panel Cannot Calibrate Correctly

- A) Please try to re-install touch driver and re-calibrate again. If not, the touch controller and touch panel could be defective.

LCD Panel is Not Functioning Properly

- A) Check that the LCD driver is installed properly (Please refer to the LCD driver installation section).
- B) Connect a LCD or CRT monitor to the VGA connector, if there is a display, then the LCD panel could be defective or is not installed properly.
- C) Move back cover, check all the LCD relative cables. (For example: check LVDS, inverter whether they are properly.)

MCR is not functioning properly

- A) Check if the MCR is properly connected to the MCR connector board on main system.
- B) Make sure the MCR 12PIN cable is properly connected to the right side wafer (which is USB hub board) of LCD.
- C) The USB hub board could be defective.
- D) The MCR module could be defective.

VFD/LCM Pole Display is not functioning properly

- A)** Ensure that COM4 is enabled in the CMOS setup, and data is written to COM4 in the application.
- B)** Ensure the jump setting of COM4 ,please refer the M/B manual.
- C)** Check if there is any display when system power is ON, if the screen is blank, please follow the steps below.
 - B-1)** Make sure the power switch on the VFD display is on before powering the main system.
- D)** Check RJ-45 cable is properly connected to I/O
- E)** Check the cable is properly connected to main board
- F)** The on-board COM4 I/O chips could be defective.

LAN is not functioning properly

- A)** Check if the LAN driver is installed properly. (Please refer to the LAN driver installation)
- B)** Check if there are any IRQ conflicts.
- C)** Check if the RJ45 cable is properly connected.
- D)** The on board LAN chip could be defective.

Printer functionality

- A)** Make sure the Printer Power Switch is on before operation
- B)** Verify the Connection Cable are well connected
- C)** All the command and Code Page, please refer to the Appendix "Printer Manual"

CHAPTER 6

Appendix(A) Thermal Printer

RS-T80

User Manual



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Declarations

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Version 2.2

Trademarks

Our registered trademarks are



Warnings and Cautions in this manual

Warning: Items shall be strictly followed to avoid damages to body and equipment.

Caution: Items with important information and prompts for operating the printer.

Certifications

The quality control system of SNBC has been approved of the following certification.



(DNV)ISO9001:2000

The environmental control system of SNBC has been approved of the following certification.



(DNV)ISO14001:2004

General Safety Instruction

Before installing and using the printer, please read the following items carefully:

1 • Safety Instructions

Caution: Do not touch the cutter of the printer.

Heating: The print head is at a high temperature during printing or just after operation. Do not touch it and its peripherals for reasons of safety.

Warning: The print head is an ESD-sensitive device. To avoid damage, do not touch either its printing parts or connecting parts.

2 • Caution

- 1) Install the printer on a flat and stable surface.
- 2) Reserve adequate space around the printer so that convenient operation and maintenance can be performed.
- 3) Keep the printer away from water source, direct sunlight, strong light and heat.
- 4) Do not use or store the printer in a place exposed to heat or fire, moisture or other pollution.
- 5) Do not place the printer in a place exposed to vibration or impact.
- 6) No dew condensation is allowed to the printer. In case of such condensation, do not turn on the power until it has completely gone away.
- 7) Connect the power cord to an appropriate grounding outlet. Avoid sharing a single electrical outlet with large power motors and other devices that may cause the fluctuation in voltage.
- 8) Disconnect the power cord if the printer is idle for a long time.
- 9) Do not spill water or other electric substances (like metal) on the printer. If this happens, turn off the power immediately.
- 10) Do not allow the printer to start printing when there is no recording paper installed, otherwise the print head and platen roller will be damaged.
- 11) To ensure quality print and normal lifetime, use recommended or good quality paper.
- 12) Shut down the printer when connecting or disconnecting interface connectors to avoid damage to the control board.
- 13) Set the print darkness to a lower grade as long as the print quality is acceptable. This will help to keep the Printhead durable.
- 14) The printer should only be disassembled or repaired by a technician, who is certified by SNBC.
- 15) Keep this manual safe and at hand for reference purpose.

1 Introduction

1.1 Outline

The BTP-R580 is a high performance, high speed thermal printer. It can be widely used for real-time receipt printing applications, such as for POS systems, restaurant, bars, ATM etc.

The BTP-R580 can be connected to host computers via a parallel interface, serial interface, USB interface, Ethernet interface or WLAN interface. The printer can also be connected with cash-drawers and the Herald kitchen alarm system.

The BTP-R580 offers drivers under WINDOWS98/NT4.0/2000/XP/VISTA and special utility software to handle amongst others downloading of logos and fonts.

1.2 Main Features

- ◇ Full spill proof design (meets IPX1 standard)
- ◇ Low noise, high printing speed up to 230mm/s
- ◇ Easy paper loading
- ◇ Paper front exit and straight paper path for reliable printing
- ◇ Internal power supply
- ◇ Easy operation and maintenance
- ◇ Simple paper jam clearing
- ◇ Continuous paper or marked paper can be used
- ◇ Three different paper width
- ◇ Auto paper cutting
- ◇ Cash drawer control connector
- ◇ Choice from several interfaces (“daughter boards”)
- ◇ Optional HERALD kitchen alarm system
- ◇ Support Watermark printing

2 Main Specification

2.1 Technical Specification

Item	Parameter
Print Method	Direct Thermal
Resolution	203DPI (H) ×203DPI (V)
Print Width	80mm (Max.)
Print Speed	230mm/s (Max.)
Memory	RAM: 2MB FLASH: 2MB/4MB
Drivers	Windows drivers (WIN98/NT/2000/XP/Vista)
Interface	Optional Parallel(IEEE1248), Serial (RS232C/RS485), USB, Ethernet, WLAN
Cash drawer	1~2 drives
Barcode Supported	UPC-A, UPC-E, EAN8, EAN13, CODABAR, CODE39, ITF, CODE128, CODE93, PDF417
Fonts	Font A: 12×24; Font B: 9×17; GB2312; GB18030, Korean, Japanese, Traditional Chinese
Character Modification	Rotate (0°, 90°, 180°, 270°), enlarges(1-6X), emphasize, underline, white/black reverse
Image process	RAM bitmap download: buffer size is 12KB FLASH bitmap download: buffer size is 256KB Direct bitmap print: support bitmap and execute quick print
Paper near end	Optical sensor
Paper end	Optical sensor
Label	Optical sensor
Top cover position	Microswitch
Print head temperature	Thermistor
Paper type	Continuous paper, marked paper
Paper width	82.5 ± 0.5mm, 80 ± 0.5mm, 57.5 ± 0.5mm
Paper roll OD	Ø100 mm (Max.)
Paper cut	Tear off, Full cut, Partial cut
Input	100~240VAC, 50~60HZ
Output	24V±5% DC, 2.3A
Printer head lifetime	≥150Km(with reference paper)
Cutter lifetime	2,000,000 cuts (Paper type: F240AC/F220-VP)
Operation condition	5℃~45℃, 20%~90% RH (40℃)
Storage condition	-40℃~60℃, 20%~93%RH (40℃)
Dimensions	147 (W) × 205 (D) × 147 (H) mm

2.2 Cutter Specification

Item	parameter	Note
Cutter type	Slide cutter (Guillotine type)	
Cutting time	600ms	The time that one cut takes
Cutting interval	2s	30 times/min. (Max.)
Paper type	0.06~0.1mm	Thermal paper or paper with the same thickness
Operation voltage	24VDC	
Max. static curren	1.2A	24VDC
Cutter lifetime	2,000,000 cuts (reference paper with thickness of 0.06 mm)	Full or partial cuts

- Full cut: Cut off the paper completely ;
- Partial cut: 2 mm paper left in middle

2.3 Paper Specification

2.3.1 Continuous paper

- Paper type: Continuous thermal paper
- Paper supply method: Paper roll
- Paper width: 82.5±0.5mm, 80±0.5mm, 57.5±0.5 mm
- Paper thickness: 0.06mm-0.1mm
- Thermal sensitive layer: Outside
- Paper roll specifications
 - OD(MAX): $\phi 100$ mm
 - ID(Min): $\phi 15$ mm

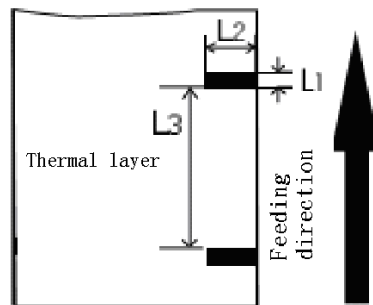
Caution:

- ✧ Do not paste the paper to the core.
- ✧ If the paper is contaminated by a chemical or oil, it may discolor or lose heat sensitivity at the polluted spot.
- ✧ Do not rub the paper surface strongly against hard objects, otherwise it may discolor.
- ✧ When the temperature goes up to 70 degrees centigrade, paper will discolor.
- ✧ Don't use or store paper under high temperature, high humidity and strong light conditions.

2.3.2 Marked paper

In marked paper mode, BTP-R580 determines the cut position and the initial printing position by referencing the position of the black mark. Black marked paper should meet the following requirement besides that of standard paper.

- L_1 Mark length: $3\text{mm} \leq L_1 \leq 10\text{mm}$.
- L_2 Mark length: $L_2 \geq 12\text{mm}$.
- L_3 Distance between marks: $20\text{mm} \leq L_3 < 500\text{mm}$.
- Mark position: Right, middle or left side on paper(80mm paper only)
- Reflectivity: The reflectivity of the black mark must be less than 15% while the reflectivity of the paper itself exceeds 85%. There shall be no printed objects like text and images in the area between the black marks.

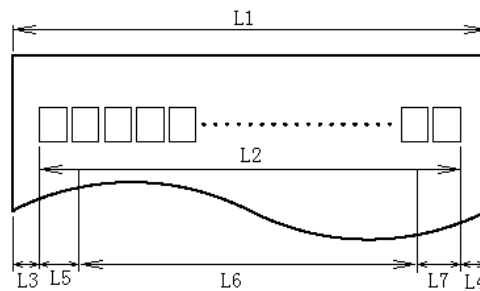


Caution:

- ✧ The printer will measure the marks during the printing or feeding process. If the lengths of the mark (L_1) is larger than the default value (default: 13mm), the printer will give a paper-end alarm.

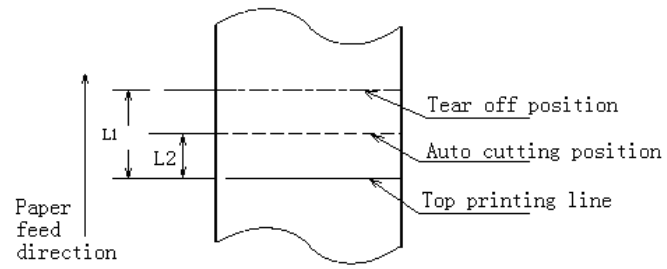
2.4 Print and cut position

2.4.1 Print position



- L_1 Paper holder width: $83.5 \pm 0.5\text{mm}$
- L_2 Max Print width: 80mm
- L_3 : Distance between left end of printhead and left side of paper holder(Fixed) $1.8 \pm 0.3\text{mm}$
- L_4 : Distance between right end of printhead and right side of paper holder(Fixed) $1.8 \pm 0.3\text{mm}$
- L_5 : Left margin (default: 7mm)
- L_6 : Print area width. Can set by command (See Programming manual), default is 64mm.
- L_7 : Right margin (default: 9mm)

2.4.2 Cut position



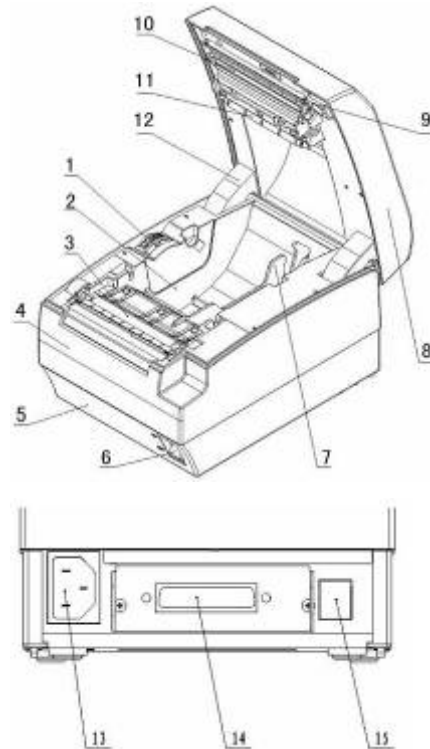
L1: about: 30mm

L2: about: 11mm

3 Outline and Parts

3.1 Outline and Parts

- 1—Paper near end sensor adjusting lever
- 2 —Paper holder
- 3 —Platen roller
- 4—Middle cover
- 5—Bottom cover
- 6 — Power switch
- 7—Paper guide
- 8—Top cover
- 9 — Cover spanner
- 10—Printhead
- 11—Paper roll shaft
- 12—Printhead support plate
- 13 —Power connector
- 14 —Communicate interface
- 15 —Cash drawer connector



Functions of parts:

a) Paper guide

Removing the paper guide or putting it in a different slot will allow the printer to use different paper widths listed as follows: 82.5 ± 0.5 mm, 80.5 ± 0.5 mm, 57.5 ± 0.5 mm.

b) Power switch

Switching the power of the printer on or off. "O" power is turned off. "—" power is turned on.

c) Feed button (See Fig 3.1-3)

Switching on the printer while pressing the FEED button will start the printing of the configuration table .

➤ In normal status:

Continuous paper mode:

- The printer will feed one line when pressing the FEED button for a short time.
- The printer will feed continuously when pressing the FEED button for a longer time

Marked paper mode:

- The printer will feed one line when pressing the FEED button for a short time.



- The printer will locate the marks when pressing the FEED button for a longer time.
 - In error status, the printer will have no activity when the FEED button is pressed.
- d) Power Indicator
Indicating power status (ON/OFF).
- e) Error indicator
Indicating some error status. Under normal conditions, ERROR LED is always off.
Under some error conditions(Cover Open 、Cutter Error 、Print head is overheating、Input voltage is abnormal), ERROR LED will flash.
- f) Paper indicator
Indicating paper status. Under normal conditions, PAPER LED is always off. When the paper status changes (paper end or paper near end), PAPER LED will flash.
- g) Paper end sensor
The paper-end sensor is used to detect whether the paper roll is out of paper.

Notices:

- ✧ The paper guide is an indispensable part of the printer and should be kept with the printer.

3.2 Error LED and Buzzers

1) Error LED

Led	Status	Description
Power Indicator (Green) (POWER)	On	Printer is powered on
	Off	Printer is powered off
Error Indicator (Red) (ERROR)	Off	Printer is in normal status
	Flash	Printer is in error status
Paper Indicator (Red) (PAPER)	On	Paper end or near end
	Flash	Macro definition is running
	Off	Printer is in normal status

2) Description of LED and Error Status

Error information	ERROR LED	PAPER LED	Buzzer
Print head is overheating	Six times	Off	Long-Short-Long
Input voltage is abnormal	Five times	Off	Short-Short-Long
Cutter Error	Four times	Off	Long-Short-Long
Cover Is Open	Three times	Off	Short-Long-Short
Paper End	Twice	On	Short-Short-Short
Paper near end	Off	On	
Finding mark error or verify failed	Flashing continuously	Off	

Caution:

- ✧ The temperature of the print-head is detected by means of a thermistor sensor. If the

temperature of the printhead becomes higher than 65⁰ C, the protection circuit of the printer will force the printer to stop printing.

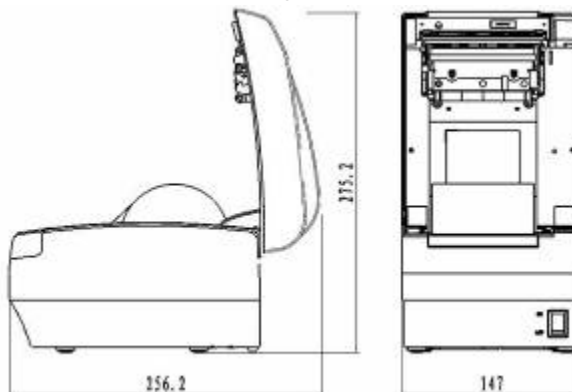
4 Installation

4.1 Unpacking

Check whether all items, that are listed on the packing list are present and in a good condition. If any items are damaged or missing, please contact your dealer.

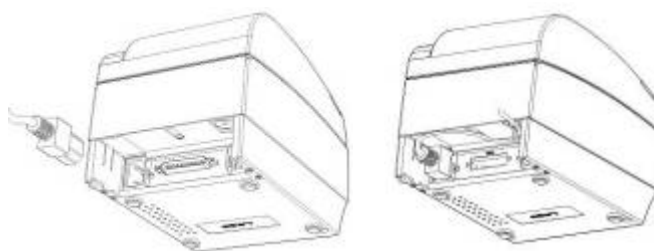
4.2 Printer installation

- 1) The printer should be installed on a flat and stable horizontal surface.
- 2) The printers should be away from any water source.
- 3) Do not place the printer on a surface exposed to vibration or risk from impact.
- 4) Ensure that the printers can be grounded safely.
- 5) During operation and maintenance of the printer there should be sufficient space around the printer in accordance with the dimensions as shown in fig. 4.2-1.



4.3 Connecting the Power Adapter

- 1) Ensure the printer power is turned off.
- 2) Insert the power cord into the power socket on the backside of the printer.
- 3) Fix the power cable cord in the printer with a clip as shown in Fig. 4.3-1.



Caution:

- ✧ When connecting or disconnecting the power cord, always hold the plug and avoid dragging it by force.
- ✧ Do not pull on the power cord, otherwise the cord may be damaged or broken, causing a risk of fire or electric shock.
- ✧ Do not place the power cord near a heating device, otherwise, the cover of the cord may melt, causing a risk of fire or electric shock.
- ✧ If the printer is not in use for a long period, disconnect the power cord from the wall outlet for safety.

4.4 Connecting interface cable

- 1) Ensure the printer power is turned off.
- 2) Connect the suitable interface cable with the correct connector to the connector of the interface board of the printer plug screws (Serial interface) or clip springs (Parallel interface).



- 3) Connect the other end of the interface cable to the host.

4.5 Connecting the Cash Drawer

- 1) Ensure the printer power is turned off.
- 2) Insert the cash drawer cable into the cash drawer connector on the back of the printer.



Caution:

- ✧ Cash drawer interface can be connected only with a cash drawer device (Do not connect a telephone line and so on).

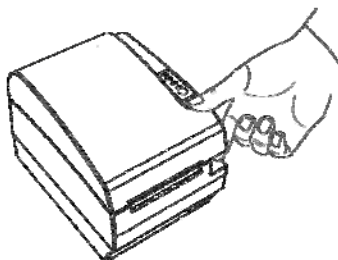
4.6 Paper roll loading

4.6.1 Confirm the paper type

After connecting of the printer to the mains voltage, with the host and, if applicable, to the cash drawer, the paper can be loaded and printed.

4.6.2 Load/replace a paper roll

- 1) Press the latch of the top cover and open it.



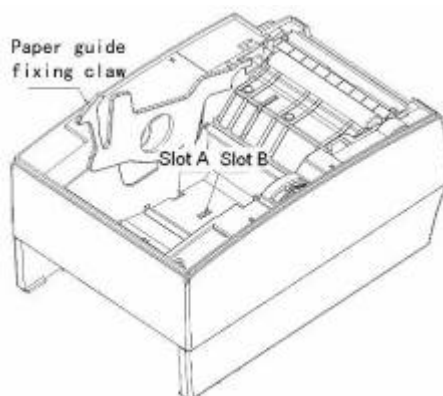
- 2) Place a paper roll in the paper holder.



- 3) Close the printer top cover.

Caution:

- ✧ If needed remove the paper guide. Choose the suitable paper guide position according to the width of the paper roll and mount the paper guide. When inserting the paper roll pay attention to the paper path direction.



Note: Without paper guide: $82.5 \pm 0.5 \text{ mm}$.

Paper guide in the slot A: $80 \pm 0.5 \text{ mm}$

Paper guide in the slot B: $57.5 \pm 0.5 \text{ mm}$

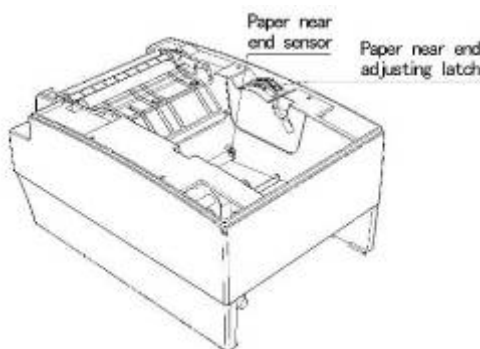
- ✧ Ensure that the paper is rolled tightly onto the paper roll, otherwise a paper jam or other

fault could happen.

- ✧ The paper roll should be placed straight in the paper holder and not at an angle. The paper roll should be able to move freely.

4.7 Paper near end position adjustment

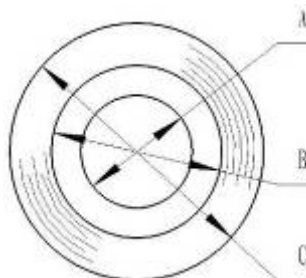
Through adjustment of the latch of the paper near end sensor to a corresponding level, different paper roll cores can be accommodated and also the remaining paper-end length can be approximated.



Caution:

The factory setting of the paper near end sensor is level 1.

- 1) When using different Diameter core shaft, C diameter may be different with the length of the remaining paper at the same level.



4.8 Switching on the printer and printing of self-test

4.8.1 Switching on the printer

- 1) Ensure that the printer is connected to the mains voltage and, if applicable, that the mains voltage is switched on.
- 2) Switch on the power of the printer.

4.8.2 Printing a self-test page

- 1) Confirm that the printer is connected to the mains voltage and that a paper roll is in the printer.
- 2) Confirm that the printer is switched off.
- 3) Press down the FEED button while switching on the printer, the printer will start printing

the configuration sheet. At the end of the configuration sheet the followings text will appear: "Press feed key to continue" The printer is holding and waiting for the input while the PAPER LED is flashing.

- 4) Press down the FEED button shortly, the printer will print a character test page which is part of the self-test.

4.9 Setting of printer parameters and configuration

The parameters of the printer can be set (configuring) in a detailed way by means of the utility software that is available from the reseller or from SNBC by special request.

5 Printer routine maintenance

Caution:

- ✧ Before starting routine maintenance, ensure that the printer is switched off.
- ✧ Do not use solvents like gasoline or acetone.
- ✧ When cleaning sensors, the printer should not be switched on until the pure alcohol has totally evaporated.
- ✧ It is recommended that the maintenance cycle should not be longer than one month.

5.1 Cleaning the platen

The steps for cleaning the platen are as given below:

- 1) Switch off the printer.
- 2) Open the top cover of the printer.
- 3) When the top cover is opened, wipe off stain such as dust on the platen by using a soft cotton cloth with neutral cleaning agent.
- 4) Close the top cover after the alcohol has evaporated completely.

5.2 Cleaning the mark sensors

The black mark sensors need to be cleaned if the printer has trouble identifying the black marks.

The steps for cleaning sensors are as below:

- 1) Switch off the printer.
- 2) Open the top cover of the printer.
- 3) Wipe off stain or dust from the surface of sensors by using a soft cotton swipe impregnated with pure alcohol.
- 4) Close the top cover of the printer after the alcohol has evaporated completely.

5.3 Clearing of a paper jam

Remove the paper, if one of the following phenomena occurs:

- The printer fails to feed out paper normally.
- Paper is feeding with load noise.

The steps for removing paper are as below:

- 1) Switch off the printer.
- 2) Open the top cover of the printer.
- 3) If the paper is jammed in the paper path, remove the wrinkled or wasted part of the paper roll.
- 4) Close the printer top cover.

6 Interface signal

6.1 Parallel interface

Parallel interface can work in IEEE 1284 compatible mode or half-byte mode, which is a 36 pin socket.

The Interface is defined as below:

Pin#	Signal source	Signal definition
1	H	NStrobe
2	H	Data 0 (Least Significant Bit)
3	H	Data 1
4	H	Data 2
5	H	Data 3
6	H	Data 4
7	H	Data 5
8	H	Data 6
9	H	Data 7 (Most Significant Bit)
10	P	NAck
11	P	Busy
12	P	Perror
13	P	Select
14	H	nAutoFd
15		Not defined
16		Logic Gnd
17		Chassis Gnd
18	P	Peripheral Logic High
19		Signal Ground (nStrobe)
20		Signal Ground (Data 1)
21		Signal Ground (Data 2)
22		Signal Ground (Data 3)
23		Signal Ground (Data 4)
24		Signal Ground (Data 5)
25		Signal Ground (Data 6)
26		Signal Ground (Data 7)
27		Signal Ground (Data 8)
28		Signal Ground (PError, Select, and nAck)
29		Signal Ground (Busy and nFault)
30		Signal Ground (nAutoFd, nSelctIn, and nInit)
31	H	NInit
32	P	NFault
33		Not defined
34		Not defined
35		Not defined
36	H	nSelectIn

6.2 Serial interface

The serial interface of the printer is compatible with RS-232 and is equipped with a 25-pin female D type connector.

PIN No.	Signal definition
PIN1	Frame Ground
PIN2	TXD
PIN 3	RXD
PIN 4	DTR
PIN 5	Not connected
PIN6	DSR
PIN 7	Signal Ground
PIN 8~19	Not connected
PIN 20	DTR
PIN 21~25	Not connected

The user may check the current setting status of the interface by printing a configuration table. The default setting is as follows:

Baud rate: 19200bps, 8 data bit, none Parity, 1 stop bit

Handshake: DTR/DSR

6.3 USB interface

➤ Parameters

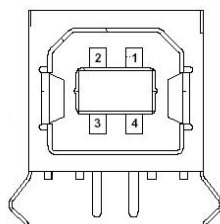
Data transmission: Support USB1.1 protocol

Connector (Printer side): USB B type socket. Support and pass USB HUB

➤ Interface signal definition and functions

Pin No.	Signal	Description
1	VBUS	+5V
2	DATA-	Printer data transmit line minus
3	DATA+	Printer data transmit line plus
4	GND	Ground

➤ Interface connector



6.4 Ethernet interface

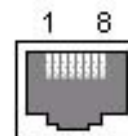
➤ Feature

- Supports 10BASE-T communication
- Compatible with Ethernet II standard frame type
- LEDs indicate network connecting status and data transmission status.
- Supports 9100 port print
- Supports ASB(Auto status back)
- Supports parameter configuration
- Supports firmware program updated online
- Supports printer status query and interface module maintenance based on HTTP.

➤ Interface signal definition

The parameters of Ethernet interface socket match 10BASE-T standard of IEEE802.3. The interface signal is defined as below:

Pin	Signal name	Description
1	TX+	Data sending+
2	TX-	Data sending-
3	RX+	Data reception+
4	NC	Reserve
5	NC	Reserve
6	RX-	Data reception-
7	NC	Reserve
8	NC	Reserve



6.5 WLAN interface

➤ Features

- Supports 802.11b、802.11g communication
- Supports 9100 port print and LPR print
- Supports ASB (Auto Status Back)
- Supports parameter configuration
- Supports firmware program upgraded online
- Supports HTTP

➤ Protocols are supported as below

- IP
- ARP
- ICMP
- TCP
- UDP
- DHCP

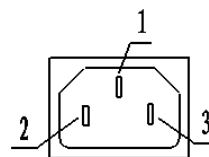
- TFTP
- HTTP

WLAN interface uses wireless USB network card of which the main specification should be requested from the local distributor or manufacture.

6.6 Signal definition of power connector

Internal signal definition of power

Pin	Signal name
1	E
2	L
3	N

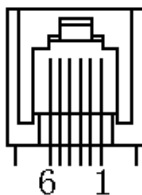


6.7 Signal definition of cash drawer interface

1) Electric characteristics

- Driving voltage: DC 24 V
- Driving current: Max. current is 1 A
- The signal for checking cash drawer status:
“L” = 0~0.5 V “H” = 3.3 V

2) Cash drawer interface socket uses RJ-11 6P connector.



3) Interface signal definition

No.	Signal	Functions
1	FG	Frame
2	DRAWER 1	Driving signal of cash drawer1
3	DRSW	Check signal for cash drawer status
4	VDR	Cash drawer driving power
5	—	NC
6	GND	Common port with circuit

Caution:

- ✧ Do not allow disconnection or connection of the interface cable plug when the printer and the host are switched on.
- ✧ Avoid the presence of devices like motors with large power as these may cause voltage fluctuations.
- ✧ Always use shielded interface cables.

7 Troubleshooting

Refer to this section if the printer has any problems.

If the problem cannot be solved, please contact your dealer.

7.1 Printer doesn't work

Faults	Possible reasons	Solution
Power LED is off and the printer doesn't work	Printer is off	Connect the printer power
	Printer is off	Turn on the printer
	Circuit board is damaged	Contact your dealer

7.2 Alarm LED and buzzer sound

Faults	Possible reasons	Solution
Paper LED on and buzzer sounds	Paper end	Replace with new paper roll
Paper LED on	Paper near end	Replace with new paper roll
Alarm LED flashes and buzzer sounds	Input voltage is abnormal	Turn off the printer power and check The input voltage
	Print head is overheated	Turn off the printer power and wait for the print head temperature recovered normally
	Cutter Error	Cutter resetting(reference 7.4)
	Cover is Open	Close the cover again
	Serious fault occurs	Contact your dealer

7.3 Problems with printing

Faults	Possible reasons	Solution
Printout is light	Print head is damaged	Replace print head
Printout is not clear or has dirt	Print head or platen is dirty	Clean print head or platen
Paper cannot be fed out properly	Paper jam	Open top cover and check paper path to remove paper jam

7.4 Cutter resetting

If the moving blade of the cutter does not return to its home-position, then the top cover should be opened and the printer should be switched on. This will force the moving blade to reset and return to its home-position. Please contact your dealer if the problem persists.

Appendix (B) – Thermal Printer RS-T80

Programming Manual



Shandong New Beiyang Information Technology Co., Ltd.

REVISION HISTORY

Date	Version	Description	Drafted by
July 30, 2007	1.00	Primary version	Ms Weiwei Xu Mr. Peng Geng
Jan 14, 2008	1.01	Change the format of command list Add Water Mark Commands	Ms Weiwei Xu

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1 Overview

This manual classifies the printer commands into several kinds based on its functions, and also describes the applications of relative commands in detail depending on its sorts. We hope that it is helpful for programmers to get known of those commands.

1.1 Commands classification

This receipt printer commands are classified as below:

Print commands: used for printing and feeding paper;

Position commands: to control the print position;

Character commands: to set characters property;

Bitmap commands: to download bitmap and print, including NV and RAM bitmap;

Status commands: used for printer status query;

Barcode commands: barcode print and property settings;

Other commands: used for periphery control, Micro-definition and initialization;

Command instruction refers to the detailed function of relative commands.

1.2 Key terms

Real-time commands – These commands are acted on immediately upon being received by the printer.

Print buffers – used to store figure data to be printed;

Page mode – Under this mode, the printer possesses all data in specified memory and thinks of this as a virtual page. The page is printed when the printer receives print command either **FF** or **ESC FF**;

Standard mode – Standard mode is the default mode of printer, namely line mode. Under this mode, the printer prints data and feeds paper upon print line buffer full (data is enough for one print line) or receiving print command like **LF**;

HRI character – Human Readable Interface;

NV – Non-volatile memory in which data stored does not loss when power off.

RAM – Random Access Memory;

DPI – Print dots per inch (one inch equals to 25.4mm). It is used to identify the resolution of a printer. Example, 203DPI means 203 print dots per inch.

Baseline – The standard position where character data in print buffers are stored. The figure shows the position of ordinary characters in standard mode and page mode:



* When font A (12 x 24 dots) is selected, the height is 24 dots;

* When font B (9 x 17 dots) is selected, the height is 17 dots;

1.3 Command format

[Function]	The name and function summary of commands;
[Format]	The command expressed in ASCII, Hex and Decimal separately. If not specified, the value in "range" part is decimal. For instance, in range "1 ≤ n ≤ 4", '1' is not an ASCII code but a decimal number;
[Range]	The value range of parameter in the command;
[Note]	Explain the main features and application notices of commands;
[Default]	The initial value used after the printer initialized;
[Relative]	Other commands related to current command;
[Demo]	Example used for current or relative commands. All command data in programming Demo use HEX. All normal font/characters are data. There is no explanation for the data of command such as 42 43 which is data. The font/character underlined and emphasized is a command such as <u>1B 40</u> . All the data inside parentheses after all commands in Demo is used to explain the meanings of this command. The parentheses and data inside it is not the command to be transmitted to the printer.

2 Command Description

2.1 Print command

LF

[Function]	Print and line feed	
[Format]	ASCII	LF
	Hex	0A
	Decimal	10
[Note]	This command sets the print position to the beginning of the line.	
[Reference]	ESC 2, ESC 3	

FF

[Function]	Print all data in the print buffers and return to the standard mode.	
[Format]	ASCII	FF
	Hex	0C
	Decimal	12
[Notes]	<ul style="list-style-type: none">· This command is valid only in page mode.· The buffer data is deleted after being printed.· The printer does not execute paper cutting.· This command sets the print position to the beginning of the line.	
[Relative]	ESC FF, ESC L, ESC S	

CR

[Function]	When the command is enabled, it equals to LF ; it is ignored when disabled,	
[Format]	ASCII	CR
	Hex	0D
	Decimal	13
[Notes]	<ul style="list-style-type: none">· Sets the print starting position to the beginning of the line.· This command is set according to the printer configuration.	
[Relative]	LF	

ESC FF

[Function]	Print data in page mode		
[Format]	ASCII	ESC	FF
	Hex	1B	0C
	Decimal	27	12
[Notes]	<ul style="list-style-type: none">· This command is enabled only in page mode.· After printing, the printer does not clear the buffered data, setting values for ESC T and ESC W, and the position for buffering character data.		

[Relative] FF, ESC L, ESC S

ESC J n

[Function] Print and feed paper

[Format]	ASCII	ESC	J	n
	Hex	1B	4A	n
	Decimal	27	74	n

[Range] $0 \leq n \leq 255$

[Notes]

- After printing is completed, this command sets the print starting position to the beginning of the line.
- The paper feed amount set by this command does not affect the values set by **ESC 2** or **ESC 3**.
- The horizontal and vertical motion unit are specified by **GS P**.
 - In standard mode, the printer uses the vertical motion unit (y).
- In page mode, this command functions as follows, depending on the starting position of the printable area:
 - 1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used.
 - 2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the horizontal motion unit (x) is used.
- The maximum line spacing is 1016mm (40 inches). When the setting value exceeds the maximum, it is converted to the maximum automatically.

[Relative] GS P

[Example] **1B 40** (initialize printer)

1D 50 CB CB (set the resolution 203x203)

41 41 41 41 41 41 41 (datas waiting for printing)

1B 4A 50 (print and feed paper 80/203 inches)

42 42 42 42 42 42 42 **0A** (datas waiting for printing)

Results:



ESC d n

[Function] Print and feed n lines

[Format]	ASCII	ESC	d	n
	Hex	1B	64	n
	Decimal	27	100	n

[Range] $0 \leq n \leq 255$

- [Notes]**
- This command sets the print starting position to the beginning of the line.
 - This command does not affect the line spacing set by **ESC 2** or **ESC 3**.
 - The maximum paper feed amount is 1016 mm (40 inches). If the paper feed amount (n x line spacing) of more than 1016 mm (40 inches) is specified, the printer feeds the paper only 1016 mm (40 inches).

[Relative] **ESC 2, ESC 3**

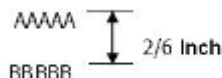
[Demo] **1B 40** (initialize printer)

41 41 41 41 41 41 41 (datas waiting for printing)

1B 64 02 (print and feed 2 characters line spacing, 2/6 inches)

42 42 42 42 42 42 42 **0A** (datas waiting for printing)

Results:



2.2 Location command

HT

[Function] Moves the print position to the next horizontal tab position.

[Format]

ASCII	HT
Hex	09
Decimal	9

- [Notes]**
- This command is ignored unless the next horizontal tab position has been set.
 - If the next horizontal tab position exceeds the printing area, the printer sets the printing position to [Printing area width + 1].
 - Horizontal tab positions are set with **ESC D**.
 - If this command is received when the printing position is at [printing area width + 1], the printer executes print buffer-full printing of the current line and horizontal tab processing from the beginning of the next line.
 - The default setting of the horizontal tab position for the paper roll is font A (12×24) every 8th character.
 - When current buffer is full, the printer shall execute the actions as below:
In standard mode, the printer shall print current line and set the print position to the beginning of next line;
 - In page mode, the printer shall shift the line and set the print position to the beginning of next line.

printable area using **ESC T**, the horizontal motion unit (x) is used.

- 2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

[Relative] **ESC \, GS \$, GS \, GS P**

[Demo] Refer to **ESC W**

ESC D n1...nk NUL

[Function] Set horizontal tab positions

[Format]	ASCII	ESC	D	n1...nk	NUL
	Hex	1B	44	n1...nk	00
	Decimal	27	68	n1...nk	0

[Range] $1 \leq n \leq 255$
 $1 \leq k \leq 32$

- [Notes]
- The horizontal tab position is stored as a value of [character width × n] measured from the beginning of the line. The character width includes the right-side character spacing, and double-width characters are set with twice the width of normal characters.
 - This command cancels the previous horizontal tab settings.
 - When setting $n = 8$, the print position is moved to column 9 by sending HT.
 - Up to 32 tab positions ($k = 32$) can be set. Data exceeding 32 tab positions is processed as normal data.
 - Transmit [n] k in ascending order and place a NUL code 0 at the end.
 - When [n] k is less than or equal to the preceding value [n] k-1, tab setting is finished and the following data is processed as normal data.
 - **ESC D NUL** cancels all horizontal tab positions.
 - The previously specified horizontal tab positions do not change, even if the character width changes.
 - The character width is memorized for each standard and page mode.

[Default] The default tab positions are at intervals of 8 characters (columns 9, 17, 25...) for font A (12 × 24).

[Relative] **HT**

[Demo] Refer to **HT**

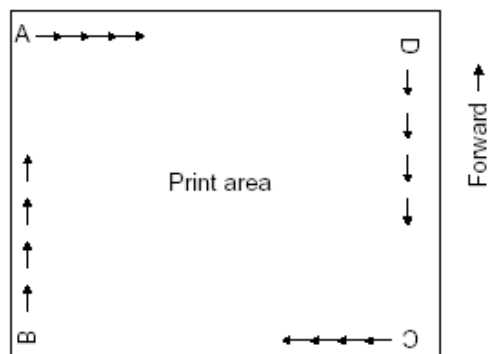
ESC T n

[Function] Selects the print direction and starting position in page mode.

[Format]	ASCII	ESC	T	n
	Hex	1B	54	n
	Decimal	27	84	n

[Range] $0 \leq n \leq 3$
 $48 \leq n \leq 51$

<i>n</i>	Print Direction	Starting Position
0, 48	Left to right	Upper left (A in the figure)
1, 49	Bottom to top	Lower left (B in the figure)
2, 50	Right to left	Lower right (C in the figure)
3, 51	Top to bottom	Upper right (D in the figure)



- [Notes]**
- When the command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
 - This command sets the position where data is buffered within the printing area.
 - Parameters for horizontal or vertical motion units (x or y) differ as follows, depending on the starting position of the printing area:
 - 1) If the starting position is the upper left or lower right of the printing area, data is buffered in the direction perpendicular to the paper feed direction:
 Commands using horizontal motion units: **ESC SP, ESC \$, ESC **
 Commands using vertical motion units: **ESC 3, ESC J, GS \$, GS **
 - 2) If the starting position is the upper right or lower left of the printing area, data is buffered in the paper feed direction:
 Commands using horizontal motion units: **ESC 3, ESC J, GS \$, GS **
 Commands using vertical motion units: **ESC SP, ESC \$, ESC **

[Default] *n* = 0

[Relative] **ESC \$, ESC L, ESC W, ESC \, GS \$, GS P, GS **

[Demo] **1B 4C** (enter page mode)

1D 50 CB CB (set printer resolution)

1B 57 20 00 00 00 40 02 90 02 (set the print area in page mode)

1B 54 00(select the print area direction in page mode)

30 30

0A (newline)

1B 54 01(select the print area direction in page mode)

31 31

0A (newline)

1B 54 02(select the print area direction in page mode)

32 32

0A (newline)

1B 54 03 (select the print area direction in page mode)

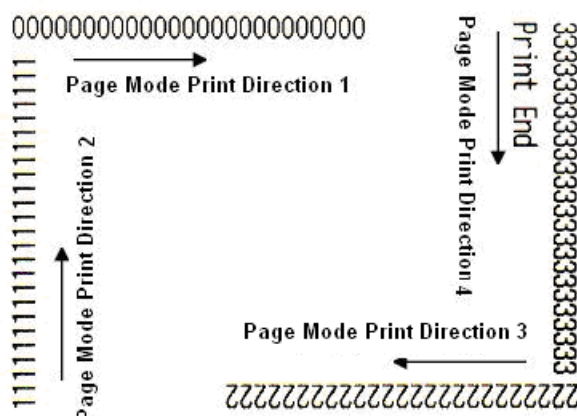
33 33

0A (print)

50 72 69 6E 74 20 45 6E 64

0C (print)

Results:



ESC W xL xH yL yH dxL dxH dyL dyH

[Function] · Define the horizontal starting position, vertical starting position, printing area width, and printing area height.

[Format]

ASCII	ESC	W xL xH yL yH dxL dxH dyL dyH
Hex	1B	57 xL xH yL yH dxL dxH dyL dyH
Decimal	27	87 xL xH yL yH dxL dxH dyL dyH

[Range] $0 \leq xL, xH, yL, yH, dxL, dxH, dyL, dyH \leq 255$ (except $dxL = dxH = 0$ or $dyL = dyH = 0$)

[Notes] · If this command is input in standard mode, the printer executes only internal flag Each the horizontal starting position, vertical starting position, printing area width, and printing area height are defined as $x0$ 、 $y0$ 、 dx 、 dy setting for the printing area is calculated as follows:

$$x0 = [(xL + xH \times 256) \times (\text{horizontal motion unit})]$$

$$y0 = [(yL + yH \times 256) \times (\text{vertical motion unit})]$$

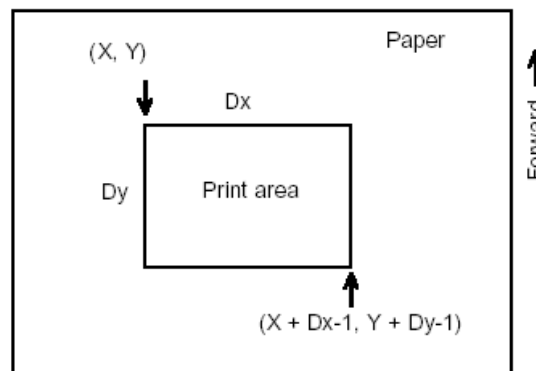
$$dx = [dxL + dxH \times 256] \times (\text{horizontal motion unit})$$

$$dy = [dyL + dyH \times 256] \times (\text{vertical motion unit})$$

The printing area is set as shown in the figure below.

This command does not affect printing in standard mode.

- If the horizontal or vertical starting position is set outside the printable area, the printer stops command processing and processes the following data as normal data.
- If the printing area width or height is set to 0, the printer stops command processing and processes the following data as normal data.
- This command sets the position where data is buffered to the position specified by **ESC T** within the printing area.
- If (horizontal starting position + printing area width) exceeds the printable area, the printing area width is automatically set to (horizontal printable area horizontal starting position).
- If (vertical starting position + printing area height) exceeds the printable area, the printing area height is automatically set to (vertical printable area – vertical starting position).
- The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current printing area.
- Use the horizontal motion unit (x) for setting the horizontal starting position and printing area width, and use the vertical motion unit (y) for setting the vertical starting position and printing area height.
- When the horizontal starting position, vertical starting position, printing area width, and printing area height are defined as X, Y, Dx, and Dy respectively, the printing area is set as shown in the figure below.



[Default] Decided by printer configuration

[Relative] **CAN, ESC L, ESC T, GS P**

[Demo] **0A**

1D 50 CB CB (set printer solution 203x203)

1B 4C (enter page mode)

1B 57 20 00 00 00 40 01 90 01 (set print area in page mode)

1B 24 00 00 (set absolute horizontal starting position to be starting point)

1B 24 32 00 (set absolute horizontal starting position to be 50/203 inches)
42

1B 24 64 00 (set absolute horizontal starting position to be 100/203 inches)
43

0A (newline)

1B 24 00 00 (set absolute horizontal starting position to be starting point)
41

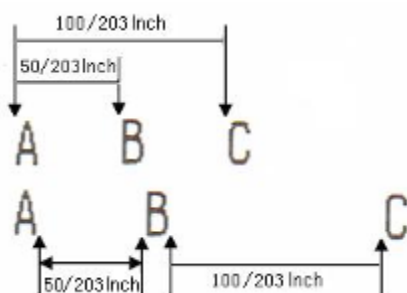
1B 5C 32 00 (set absolute horizontal starting position to be 50/203 inches)

1B 5C 64 00 (set relative horizontal starting position to be 100/203 inches)
43

0A (newline)

0C (print in page mode)

Results:



ESC \ nL nH

[Function] Sets the print starting position based on the current position by using the horizontal or vertical motion unit.

- This command sets the distance from the current position to $[(nL + nH \times 256) \times \text{horizontal or vertical motion unit}]$

[Format]	ASCII	ESC	\	nL	nH
	Hex	1B	5C	nL	nH
	Decimal	27	92	nL	nH

[Range] $0 \leq nL \leq 255$
 $0 \leq nH \leq 255$

[Notes]

- Any setting that exceeds the printable area is ignored.
- When pitch N is specified to the right: $nL + nH \times 256 = N$
When pitch N is specified to the left (the negative direction), use the complement of 65536.
When pitch N is specified to the left: $nL + nH \times 256 = 65536 - N$

- The print starting position moves from the current position to [N × horizontal or vertical motion unit]
- The horizontal and vertical motion units are specified by **GS P**.
- In standard mode, the horizontal motion unit is used.
 - In page mode, the horizontal or vertical motion unit differs as follows, depending on the starting point of the printing area:
- 1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
- 2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

[Relative] ESC \$, GS P

ESC a n

[Function] Aligns all the data in one line to the specified position

[Format] ASCII ESC a n
 Hex 1B 61 n
 Decimal 27 97 n

[Range] $0 \leq n \leq 2, 48 \leq n \leq 50$

n selects the justification as follows:

n	Justification
0, 48	Left justification
1, 49	Centering
2, 50	Right justification

- [Notes]**
- This command is enable only when processed at the beginning of the line in the standard mode.
 - If this command is input in page mode, the printer performs only internal flag operations.
 - This command justifies the space area according to HT, **ESC \$** or **ESC**.

[Default] n = 0

[Demo] **0A** (Entering line mode)

1B 40 (Initialization)

1B 61 00 (Setting left justification)

41 42 43 **0A**

41 42 43 44 **0A**

41 42 43 44 45 **0A**

1B 61 01 (Setting centering)

41 42 43 **0A**

41 42 43 44 **0A**

41 42 43 44 45 **0A**

1B 61 02 (Setting right justification)

41 42 43 **0A**

41 42 43 44 **0A**

41 42 43 44 45 **0A**

Results:

Left justification	Centering	Right justification
<div style="border: 1px solid black; padding: 5px;"> ABC ABCD ABCDE </div>	<div style="border: 1px solid black; padding: 5px;"> ABC ABCD ABCDE </div>	<div style="border: 1px solid black; padding: 5px;"> ABC ABCD ABCDE </div>

GS \$ nL nH

[Function] This command sets the absolute print position to $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$ inches.

[Format]

ASCII	GS	\$	nL nH
Hex	1D	24	nL nH
Decimal	29	36	nL nH

[Range] $0 \leq nL \leq 255, 0 \leq nH \leq 255$

[Notes]

- This command is effective only in page mode.
- If the $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$ exceeds the specified printing area, this command is ignored.
- The horizontal starting buffer position does not move after run this command. Relative starting position is that specified by **ESC T**.
- This command operates as follows, depending on the starting position of the printing area specified by **ESC T**:
 - 1) When the starting position is set to the upper left or lower right, this command sets the absolute position in the horizontal direction.
 - 2) When the starting position is set to the upper right or lower left, this command sets the absolute position in the vertical direction.
- The horizontal and vertical motion units are specified by **GS P**.

[Relative] ESC \$, ESC T, ESC W, ESC \, GS P, GS \

[Demo] See ESC W

GS L nL nH

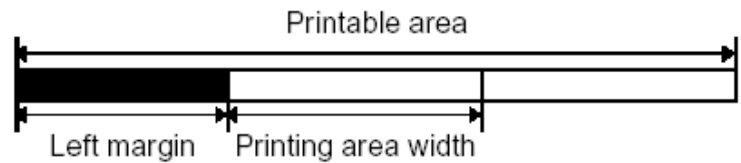
[Function] Set left margin to $[(nL + nH \times 256) \times \text{horizontal motion unit}]$ inches

[Format]

ASCII	GS	L	nL nH
Hex	1D	4C	nL nH
Decimal	29	76	nL nH

[Range] $0 \leq nL \leq 255$

$0 \leq nH \leq 255$



- [Notes]**
- This command is effective only processed at the beginning of the line in standard mode.
 - If this command is input in page mode, this command is not effective and the printer regard this command as normal character to dispose.
 - This command does not affect printing in page mode.
 - If the setting exceeds the printable area, the maximum value of the printable area is used.
 - The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal and vertical motion unit does not affect the current left margin.

[Default] nL = 0, nH = 0

[Relative] GS P, GS W

[Exmple] 0A (Sets printing position at the begin of the line)

1B 40 (Initialization)

30 31 32 33 34 35 36 37 38 39 30 31 32 33 34 35 36 37 38 39 30 31 32 33 34 35 36 37 38

39 0A

1D 4C 30 00 (Sets left margin to 48/203 inch)

30 31 32 33 34 35 36 37 38 39 30 31 32 33 34 35 36 37 38 39 30 31 32 33 34 35 36 37 38

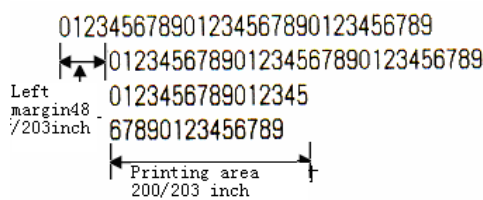
39 0A

1D 57 C8 00 (Sets printing width to 200/203 inch)

30 31 32 33 34 35 36 37 38 39 30 31 32 33 34 35 36 37 38 39 30 31 32 33 34 35 36 37 38

39 0A

Results:



GS P x y

[Function] Sets the horizontal and vertical motion units to approximately 25.4/ x mm { 1/ x inches} and approximately 25.4/ y mm {1/ y inches}, respectively.

[Format]	ASCII	GS	P	x	y
	Hex	1D	50	x	y
	Decimal	29	80	x	y

[Range] 0 ≤ x ≤ 255

0 ≤ y ≤ 255

- [Notes]**
- When x and y are set to 0, the default setting of each value is used.
 - The horizontal direction is perpendicular to the paper feed direction and the vertical direction is the paper feed direction.
 - In standard mode, the following commands use x or y, regardless of character rotation (upside-down or 90° clockwise rotation):
 - 1) Commands using x: **ESC SP, ESC \$, ESC \, FS S, GS L, GS W**
 - 2) Commands using y: **ESC 3, ESC J, GS V**
 - In page mode, the following command use x or y, depending on character orientation:
 - 1) When the print starting position is set to the upper left (Printing direction from left to right) or lower right (Printing direction from right to left) of the printing area using **ESC T**:

Commands using x: **ESC SP, ESC \$, ESC W, ESC \, FS S**

Commands using y: **ESC 3, ESC J, ESC W, GS \$, GS \, GS V**
 - 2) When the print starting position is set to the upper right (Printing direction from top to down) or lower left (Printing direction from down to top) of the printing area using **ESC T**:

Commands using x: **ESC 3, ESC J, ESC W, GS \$, GS **

Commands using y: **ESC SP, ESC \$, ESC W, ESC \, FS S, GS V**
 - The command does not affect the previously specified values.
 - The minimum motion unit is the compositive results of this command and other command motion.
 - 1inch=25.4mm.

[Default] x = 203, y = 203, this time one motion unit is a printing dots . The horizontal distances is about 1/8mm and the vertical distance is about 1/8mm.

[Relative] **ESC SP, ESC \$, ESC 3, ESC J, ESC W, ESC \, GS \$, GS L, GS V, GS W, GS **

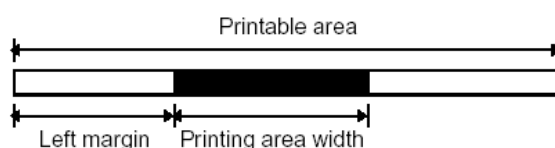
GS W nL nH

[Function] Set printing area width

[Format]	ASCII	GS	W	nL	nH
Hex		1D	57	nL	nH
Hecimal		29	87	nL	nH

[Range] $0 \leq nL \leq 255$
 $0 \leq nH \leq 255$

[Notes] • The printing area width is set to $[(nL + nH \times 256) \times \text{horizontal motion unit}]$ inches.



- The command is effective only processed at the beginning of the line.
- In page mode, this command is void and command data is disposed as normal character.
- This command does not affect printing in page mode.

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- If the [left margin + printing area width] exceeds the printable area, [printable area width - left margin] is used.
- The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal and vertical motion units does not affect the current left margin.
- The horizontal motion unit (x) is used for calculating the printing area width.

[Default] nL = 76, nH = 2

[Relative] GS L, GS P

[Demo] See **GS L**

GS \ nL nH

[Function] Set relative vertical print position in page mode

[Format]	ASCII	GS	\nL	nH
	Hex	1D	5C	nL nH
	Hecimal 29	92	nL	nH

[Range] 0 ≤ nL ≤ 255

0 ≤ nH ≤ 255

- [Notes]
- This command sets the distance from the current position to [(nL + nH × 256) × vertical or horizontal motion unit] inches.
 - This command is ignored unless page mode is selected.
 - When pitch N is specified to the movement downward: $nL + nH \times 256 = N$
When pitch N is specified to the movement upward: $nL + nH \times 256 = 65536 - N$
 - Any setting that exceeds the specified printing area is ignored.
 - This command function as follows, depending on the print starting position set by **ESC T**:
When the starting position is set to the upper left (printing from left to right)or lower right (printing from left to right)of the printing, the vertical motion unit (y) is used.
When the starting position is set to the upper right (printing from up to down)or lower left (printing from down to up)of the printing area, the horizontal motion unit (x) is used.
 - The horizontal and vertical motion unit are specified by **GS P**.
 - The horizontal and vertical motion unit is changed by **GS P**.

[Relative] ESC \$, ESC T, ESC W, ESC \, GS \$, GS P

2.3 Character command

CAN

[Function] In page mode, deletes all the print data in current area.

[Format]	ASCII	CAN
	Hex	18
	Hecimal	24

- [Notes]
- This command is enable only in page mode.
 - If data that existed in the previously specifited printing data also exists in the currentlly

specified printing area, it is deleted.

[Relative] ESC L, ESC W

[Demo] **1B 40** (Initialization)

1D 50 CB CB (Setting resolution 203×203)

1B 4C (Enter page mode)

1B 57 00 00 00 00 20 02 E8 00 (Setting printing width and height in page mode)

31 32 33 34 35 36 37 38 39 30 61 62 63 64 65 64 66 67 68 69 6A 6B 6C 6D 6E 6F 70 71
72 73 74 75 76 77 78 79 7A 31 32 33 34 35 36 37 38 39 30 61 62 63 64 65 64 66 67 68 69
6A 6B 6C 6D 6E 6F 70 71 72 73 74 75 76 77 78 79 7A 31 32 33 34 35 36 37 38 39 30 61
62 63 64 65 64 66 67 68 69 6A 6B 6C 6D 6E 6F 70 71 72 73 74 75 76 77 78 79 7A 31 32
33 34 35 36 37 38 39 30 61 62 63 64 65 64 66 67 68 69 6A 6B 6C 6D 6E 6F 70 71 72 73
74 75 76 77 78 79 7A 31 32 33 34 35 36 37 38 39 30 61 62 63 64 65 64 66 67 68 69 6A 6B
6C 6D 6E 6F 70 71 72 73 74 75 76 77 78 79 7A 31 32 33 34 35 36 37 38 39 30 61 62 63 64
65 64 66 67 68 69 6A 6B 6C 6D 6E 6F 70 71 72 73 74 75 76 77 78 79 7A 31 32 33 34 35
36 37 38 39 30 61 62 63 64 65 64 66 67 68 69 6A 6B 6C 6D 6E 6F 70 71 72 73 74 75 76
77 78 79 31 32 33 34 35 36 37 38 39 30 61 62 63 64 65 64 66 67 68 69 6A 6B 6C 6D 6E
6F 70 71 72 73 74 75 76 77 78 79

1B 57 44 00 10 00 7C 01 AA 00 (Setting the size of page need to be deleted)

18 (Delete data in page buffer)

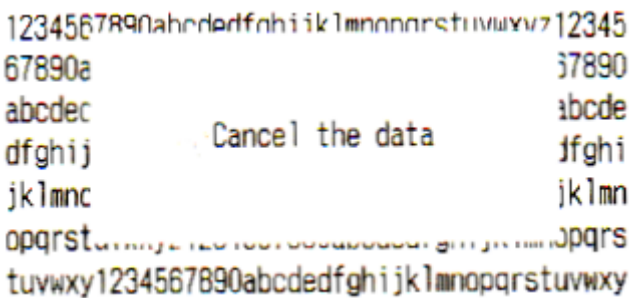
1B 24 64 00 (Setting abosolute horizontal print position as 100 dots)

1D 24 60 00 (Setting abosolute vertical print position as 96 dots)

43 61 6E 63 65 6C 20 74 68 65 20 64 61 74 61 20

0A 0C (Printing)

Results:



ESC SP n

[Function] Set right-side character spacing

[Format]	ASCII	ESC	SP	n
	Hex	1B	20	n
	Hecimal	27	32	n

[Range] 0 ≤ n ≤ 255

[Notes] • Sets the character spacing for the right side of the character to [n×horizontal or vertical

motion unit] inch.

- When characters are enlarged, the right-side character spacing is n times normal value.
- This command sets values independently in each mode (standard and page modes)
- The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current right-side spacing.
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area as follows:
 - 1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
 - 2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.
- The maximum right-side spacing is 255/180 inches. Any setting exceeding the maximum is converted to the maximum automatically.

[Default] n = 0

[Demo] 1B 40

1B 20 00 (Set right-side character spacing as 0)

41 41 41 41 41 0A

1B 20 06 (Set character spacing as 6/203 inch)

42 42 42 42 42 0A

1B 20 0C (Set character spacing as 12/203 inch)

43 43 43 43 43 0A

Results:

```

AAAAA      ←Without Character Spacing
BBBBB      ← Character Spacing is 6/203 Inch
C C C C C   ← Character Spacing is 12/203 Inch
  
```

ESC ! n

[Function] Select print mode(s)

[Format]

ASCII	ESC	!n
Hex	1B	21 n
Hecimal	27	33 n

[Range] $0 \leq n \leq 255$

[Notes] • Selects print mode(s) using n as follows

Bit	1/0	HEX	Decimal	Function
0	0	00	0	Standard ASCII Font (12 × 24)
	1	01	1	Compress ASCII Font (9 × 17)
1,2				Undefined

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3	0	00	0	Emphasized mode not selected
	1	08	8	Emphasized mode selected
4	0	00	0	Double-height mode not selected
	1	10	16	Double-height mode selected
5	0	00	0	Double-width mode not selected
	1	20	32	Double-width mode selected
6				Undefined
7	0	00	0	Underline mode not selected
	1	80	128	Underline mode selected

- When both double-height and double-width modes are selected, quadruple size characters are printed.
- The printer can underline all characters, but can not underline the space set by **HT** or 90° clockwise rotated characters.
- The thickness of the underline is that selected by **ESC -**, regardless of the character size.
- When some characters in a line are double or more height, all the characters on the line are aligned at the baseline.
- **ESC E** can also turn on or off emphasized mode. However, the setting of the last received command is effective.
- **ESC -** can also turn on or off underline mode. However, the setting of the last received command is effective.
- **GS !** can also select character size. However, the setting of the last received command is effective.

[Default] n = 0

[Relative] **ESC -, ESC E, GS !**

[Demo] **1B 40** (Initialization)

1B 21 00 (Select normal print mode)

48

1B 21 01 (Select compress font mode)

48

1B 21 08 (Select emphasized mode)

48

1B 21 10 (Select double-height mode)

48

1B 21 20 (Select double-width mode)

48

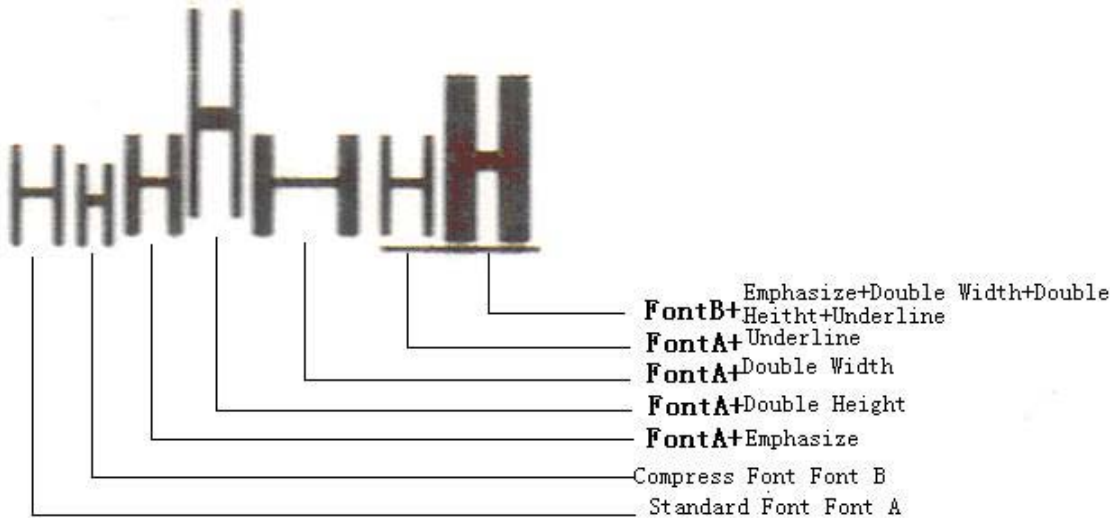
1B 21 80 (Select underline mode)

48

1B 21 B9 (Select compress, emphasized, double-width, double-height and underline mode)

48 0A

Results:



ESC % n

[Function] Select/cancel user-defined character set

[Format]

ASCII	ESC	%	n
Hex	1B	25	n
Decimal	27	37	n

[Range] $0 \leq n \leq 255$

[Notes]

- When the LSB of n is 0, the user-defined character set is canceled.
- When the LSB of n is 1, the user-defined character set is selected.
- When the user-defined character set is canceled, the internal character set is automatically selected.
- n is available only for the least significant bit.

[Default] n = 0

[Relative] ESC &, ESC ?

ESC & y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]

[Function] Define user-defined characters

[Format]

ASCII	ESC	&	y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]
Hex	1B	26	y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]
Decimal	27	38	y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]

[Range] y = 3

$32 \leq c1 \leq c2 \leq 127$

$0 \leq x \leq 12$ Standard ASCII font (12 × 24)

$0 \leq x \leq 9$ Compress ASCII font (9 × 17)

$0 \leq d1 \dots d(y \times xk) \leq 255$

- y specifies the number of bytes in the vertical direction.
- c1 specifies the beginning character code for the definition, and c2 specifies the final code.
- x specifies the number of dots in the horizontal direction.

[Notes]

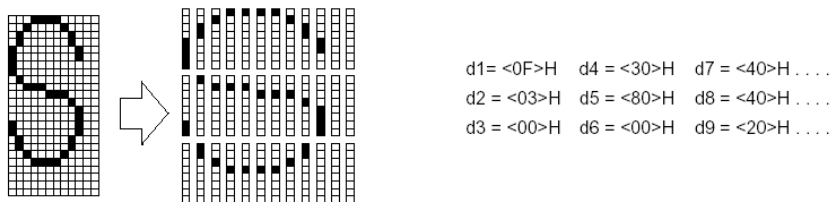
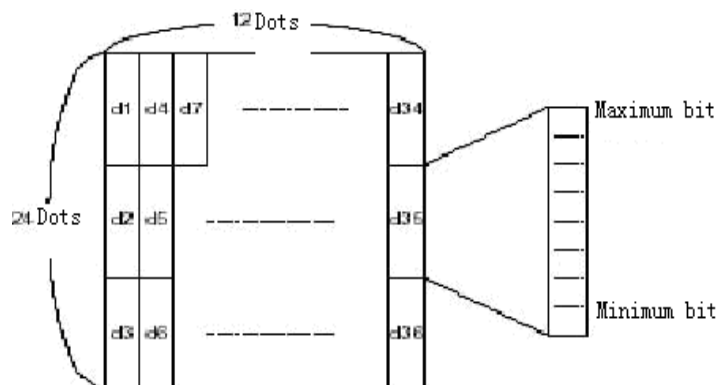
- The allowable character code range is from ASCII code <20>H to <7F>H (96 characters).
- It is possible to define multiple characters for consecutive character codes. If only one character is desired, use c1 = c2.
- d is the dot data for the characters. The dot pattern is in the horizontal direction from the left side.
- The data to define a user-defined character is (y × x) bytes.
- Set a corresponding bit to 1 to print a dot or 0 to not print a dot.
- The user-defined character definition is cleared when:
 - 1) **ESC ?** is executed.
 - 2) The power is turned off.

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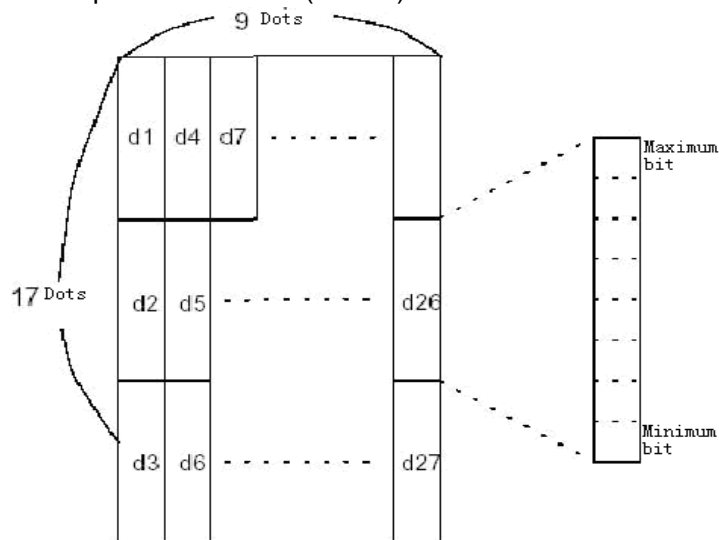
[Default] The internal character set

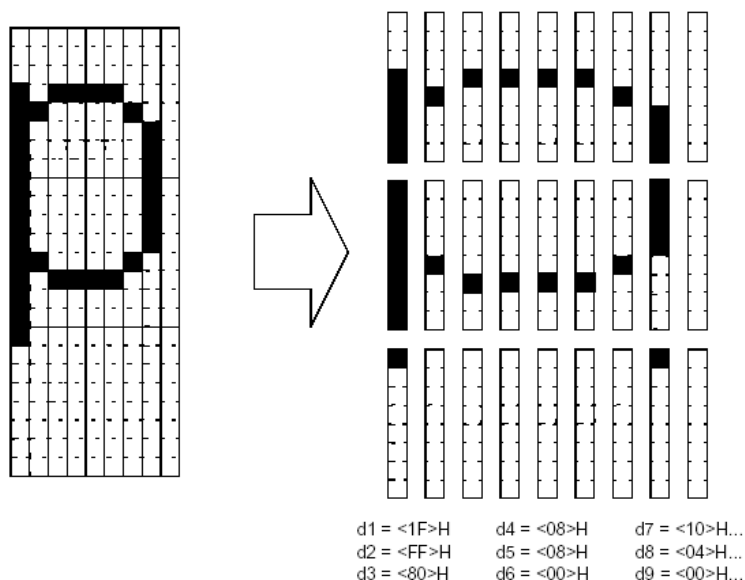
[Relative] **ESC %, ESC ?**

[Demo] • When standard ASCII font (12 × 24) is selected



• When compress ASCII font (9 × 17) is selected





ESC – n

[Function] Turn underline mode on/off

[Format]

ASCII	ESC	-	n
Hex	1B	2D	n
Decimal	27	45	n

[Range] $0 \leq n \leq 2$, $48 \leq n \leq 50$

[Notes] Turns underline mode on or off, based on the following values of n:

n	Function
0, 48	Turns off underline mode
1, 49	Turns on underline mode (1-dot thick)
2, 50	Turns on underline mode (2-dots thick)

- The printer can underline all characters (including right-side character spacing), but cannot underline the space set by **HT**.
- The printer cannot underline 90° clockwise rotated characters and white/black inverted characters.
- When underline mode is turned off, the following data is not underlined, and the underline thickness set before the mode is turned off does not change. The default underline thickness is 1 dot.
- Changing the character size does not affect the current underline thickness.
- Underline mode can also be turned on or off by using **ESC !**. Note, however, that the last received command is effective.

[Default] n = 0

[Relative] ESC !

[Demo] **1B 40**

1B 2D 02 (2-dot thick underline)

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41 41 41 41 41 41 0A
1B 2D 01 (1-dot thick underline)
 42 42 42 42 42 42 0A
 1B 2D 00 (Turn off underline)
 43 43 43 43 43 43 0A

Results:

AAAAAA → 2-dot thick underline
BBBBBB → 1-dot thick underline
CCCCCC → Turn off underline

ESC ? n

[Function]	Cancel user-defined characters			
[Format]	ASCII	ESC	?	n
	Hex	1B	3F	n
	Hecimal	27	63	n
[Range]	32 ≤ n ≤ 127			
[Notes]	<ul style="list-style-type: none"> • This command cancels the pattern defined for the character code specified by n. After the user-defined characters are canceled, the corresponding pattern for the internal character is printed. • If a user-defined character has not been defined for the specified character code, the printer ignores this command. 			
[Relative]	ESC &, ESC %			

ESC E n

[Function]	Turn emphasized mode on/off			
[Format]	ASCII	ESC	E	n
	Hex	1B	45	n
	Hecimal	27	69	n
[Range]	0 ≤ n ≤ 255			
[Notes]	<ul style="list-style-type: none"> • When the LSB of n is 0, emphasized mode is turned off. • When the LSB of n is 1, emphasized mode is turned on. • Only the least significant bit of n is enabled. • This command and ESC ! turn on and off emphasized mode in the same way. 			
[Default]	n = 0			
[Relative]	ESC !			
[Demo]	<u>1B 40</u>			

1B 45 01 (Emphasized mode is selected)
 41 41 41 41 41 41 0A
1B 45 00 (Emphasized mode is not selected)
 42 42 42 42 42 42 0A

Results:

AAABBB ← Turn off emphasized mode
AAABBB ← Turn on emphasized mode

ESC G n

[Function] Turn on/off double-strike mode

[Format] ASCII ESC G n
 Hex 1B 47 n
 Hecimal 27 71 n

[Range] $0 \leq n \leq 255$

[Notes]

- When the LSB of n is 0, double-strike mode is turned off.
- When the LSB of n is 1, double-strike mode is turned on.
- Only the lowest bit of n is enabled .
- Printer output is the same in double-strike mode and in emphasized mode.

[Default] n = 0

[Relative] **ESC E**

[Demo] See **ESC E**

ESC M n

[Function] Select character font

[Format] ASCII ESC M n
 Hex 1B 4D n
 Hecimal 27 77 n

[Range] n = 0, 1, 2,3,48, 49,50,51

n	Function
0,48	Standard ASCII Font (12 × 24) selected
1,49	Compress ASCII font (9 × 17) selected
2,50	User defined character selected
3,51	Chinese font (24 × 24) selected

[Demo] 1B 40
1B 4D 01 (Compress font selected)
 41 41 41 42 42 42 30 30 30 31 31 31 0A
1B 4D 00 (Standard font selected)
 41 41 41 42 42 42 30 30 30 31 31 31 0A

Results:

AAABBB000111 → Compress Font Font B 9X17
 AAABBB000111 → Standard Font Font A 12X24

ESC R n

[Function] Select an international character set

[Format] ASCII ESC R n
Hex 1B 52 n
Decimal 27 82 n

[Range] $0 \leq n \leq 12$

[Notes] Selects an international character set n from the following table :

	Character set
0	U.S.A
1	France
2	Germany
3	U.K
4	Denmark I
5	Sweden
6	Italy
7	Spain I
8	Japan
9	Norway
10	Denmark II
11	Spain II
12	Latin America
13	Korea

[Default] $n = 0$

ESC V n

[Description] Turn 90° clockwise rotation mode on/off

[Format] ASCII ESC V n
Hex 1B 56 n
Hecimal 27 86 n

[Range] $0 \leq n \leq 1, 48 \leq n \leq 49$

[Notes] n is used as follows.:

n	Function
0 , 48	Turns off 90° clockwise rotation mode
1 , 49	Turns on 90° clockwise rotation mode

- his command effective only in standard mode.
- When underline mode is turned on, the printer does not underline 90° clockwise-rotated.
- Double-width and double-height commands in 90° rotation mode enlarge characters in the opposite directions from double-height and double- width commands in normal mode.

[Default] $n = 0$

[Relative] ESC !, ESC

[Demo] **1B 40**
 1B 56 01 (Turn 90° clockwise rotation mode on)
 41 41 41 42 42 42 **0A**
 1B 56 00 (Turn 90° clockwise rotation mode off)
 41 41 41 42 42 42 **0A**

Results:

➤➤➤➤➤➤ ➡ Turn 90° clockwise rotation mode off
 AAABBB ➡ Turn 90° clockwise rotation mode on

ESC t n

[Function] Selects character code table

[Format] ASCII ESC tn
 Hex 1B 74 n
 Hecimal 27 116 n

[Range] 0≤n≤5, 16≤n≤19

n	Code	n	Code
0	PC437	12	PC857
1	Katakana	16	WPC1252
2	PC850	17	PC866
3	PC860	18	PC852
4	PC863	19	PC858
5	PC865	38	WPC1257

[Notes] This command is unable in Chinese font

[Default] PC437 code

ESC { n

[Function] Turns on/off upside-down printing mode

[Format] ASCII ESC { n
 Hex 1B 7B n
 Hecimal 27 123 n

[Range] 0 ≤ n ≤ 255

[Notes] • When the LSB of n is 0, upside-down printing mode is turned off.
 • When the LSB of n is 1, upside-down printing mode is turned on.
 • Only the lowest bit of n is valid.
 • This command is enabled only when processed at the beginning of a line in standard mode.
 • When this command is input in page mode, the printer performs only internal flag operations.
 • This command does not affect printing in page mode.
 • In upside-down printing mode, the printer rotates the line to be printed by 180° and then prints it.

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[Default] n = 0

[Demo] **1B 40**

1B 7B 01 (Turn on upside-down printing mode)

41 42 43 44 45 46 **0A**

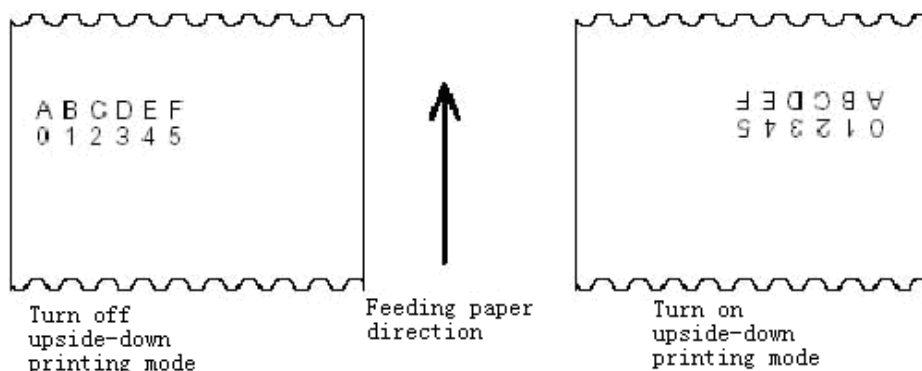
30 31 32 33 34 35 **0A**

1B 7B 00 (Turn off upside-down printing mode)

41 42 43 44 45 46 **0A**

30 31 32 33 34 35 **0A**

Results:



GS ! n

[Function] Select character size

[Format] ASCII GS ! n
 Hex 1D 21 n
 Decimal 29 33 n

[Range] $0 \leq n \leq 255$

($1 \leq$ vertical number of times ≤ 6 , $1 \leq$ horizontal number of times ≤ 6)

[Notes] Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 7 as follows:

Bit	Off/On	Hex	Decimal	Function
0-3				Character height selection. See Table 2.
4-7				Character width selection. See Table 1.

Table 1 Character Width Selection			Table 2 Character Height Selection		
Hex	Decimal	Width	Hex	Decimal	Height
00	00	0(Normal)	00	0	1 (Normal)
10	16	2(double Width)	01	1	2(Double height)
20	32	3	02	2	3
30	48	4	03	3	4
40	64	5	04	4	5
50	80	6	05	5	6

This command is effective to all characters (alphanumeric and Kanji) except for HRI characters.

If *n* is outside of the defined range, this command will be ignored.

In standard mode, the vertical direction is the paper feed direction, and the horizontal direction is perpendicular to the paper feed direction. However, when character orientation changes in 90° clockwise-rotation, the relationship between vertical and horizontal directions is reversed.

In page mode, vertical and horizontal directions are based on the character orientation.

When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline.

The **ESC !** command can also turn double-width and double-height modes on or off. However, the setting of the last received command is effective.

[Default] *n* = 0

[Relative] **ESC !**

[Demo] Refers to **ESC !**

GS B n

[Function] Turn white/black reverse printing mode

[Format] ASCII GS B *n*
 Hex 1D 42 *n*
 Decimal 29 66 *n*

[Range] $0 \leq n \leq 255$

[Notes] Turns on or off white/black reverse printing mode.

- When the LSB of *n* is 0, white/black reverse mode is turned off.
- When the LSB of *n* is 1, white/black reverse mode is turned on.

[Notes]

- Only the lowest bit of *n* is valid.
- This command is effective to all characters (alphanumeric and Kanji) except for HRI characters..
- When white/black reverse printing mode is on, it also applied to character spacing set by **ESC SP**.
- This command does not affect bit image, user-defined bit image, bar code, HRI characters, and spacing set by **HT**, **ESC \$**, and **ESC **.
- This command does not affect the space between lines.
- White/black reverse mode has a higher priority than underline mode. Even if underline mode is on, it is disabled (but not canceled) when white/black reverse mode is selected.

[Default] *n* = 0

[Demo] **1B 40**

1D 42 01 (Turn white/black reverse mode on)

41 41 41 42 42 42 **0A**
1D 42 00 (Turn white/black reverse mode off)
 41 41 41 42 42 42 **0A**

Results:

AAABBB → Turn white/black reverse mode on
AAABBB → Turn white/black reverse mode off

FS ! n

[Function] Set print mode(s) for Kanji characters

[Format] ASCII FS ! n
 Hex 1C 21 n
 Decimal 28 33 n

[Range] 0 ≤ n ≤ 255

[Description] Sets the print mode for Kanji characters, using n as follows:

Bit	0/1	Hex	Decimal	Status for ASB
0, 1				Undefined
2	0	00	0	Double-width mode is OFF
	1	04	4	Double-width mode is ON
3	0	00	0	Double-height mode is OFF.
	1	08	8	Double-height mode is ON
4-6				Undefined
7	0	00	0	Underline mode is OFF
	1	80	128	Underline mode is ON

[Notes]

When both double-width and double-height modes are set (including right- and left-side character spacing), quadruple-size characters are printed.

- The printer can underline all characters (including right- and left-side character spacing), but cannot underline the space set by **HT** and 90° clockwise-rotated characters.
- The thickness of the underline is that specified by **FS -**, regardless of the character size.
- When some of the characters in a line are double or more height, all the characters on the line are aligned at the baseline.
- It is possible to emphasize the Kanji character using **FS W** or **GS !**, the setting of the last received command is effective.
- It is possible to turn under line mode on or off using **FS -**, and the setting of the last received command is effective.

[Default] n = 0

[Relative] **FS-**, **FS W**, **GS !**

[Demo] Refers to **ESC !**

FS &

[Function] Select Kanji character mode

[Format]

ASCII	FS	&
Hex	1C	26
Decimal	28	38

[Description] Selects Kanji character mode.

[Notes] When the kanji character mode is selected, the printer checks whether the code is for Kanji or not, then processed the first byte and the second byte if the code is for Kanji.

- Kanji codes are processed in the order of the first byte and second byte.
- Kanji character mode is not selected when the power is turned on.

[Relative] **FS ., FS C**

FS - n

[Function] Turn underline mode on/off for Kanji characters

[Format]

ASCII	FS	-	n
Hex	1C	2D	n
Decimal	28	45	n

[Range] $0 \leq n \leq 2$, $48 \leq n \leq 50$

[Description] Turns underline mode for Kanji characters on or off, based on the following values

of n.

n	Function
0, 48	Turns off underline mode for Kanji characters
1, 49	Turns on underline mode for Kanji characters (1-dot thick)
2, 50	Turns on underline mode for Kanji characters (2-dot thick)

[Notes] The printer can underline all characters (including right- and left-side character spacing), but cannot underline the space set by **HT** and 90° clockwise-rotated characters.

After the underline mode for Kanji characters is turned off, underline printing is no longer performed, but the previously specified underline thickness is not changed. The default underline thickness is 1 dot.

The specified line thickness does not change even when the character size changes.

It is possible to turn underline mode on or off using **FS !**, and the last received command is effective.

[Default] n = 0

[Relative] **FS !**

[Demo] Refers to **ESC_**

FS .

[Function] Cancel Kanji character mode

[Format]

ASCII	FS	.
Hex	1C	2E
Decimal	28	46

[Description] Cancels Kanji character mode.

[Notes] For Chinese Kanji model:

When the Kanji character mode is not selected, all character codes are processed one byte at a time as ASCII code.

Kanji character mode is selected when the power is turned on.

[Relative] FS &, FS C

FS 2 c1 c2 d1...dk

[Function] Define user-defined Kanji characters

[Format]

ASCII	FS	2	c1	c2	d1...dk
Hex	1C	32	c1	c2	d1...dk
Decimal	28	50	c1	c2	d1...dk

[Range] c1 and c2 indicate character codes for the defined characters.

c1 = FEH,

$A1H \leq c2 \leq FEH$

$0 \leq d \leq 255$

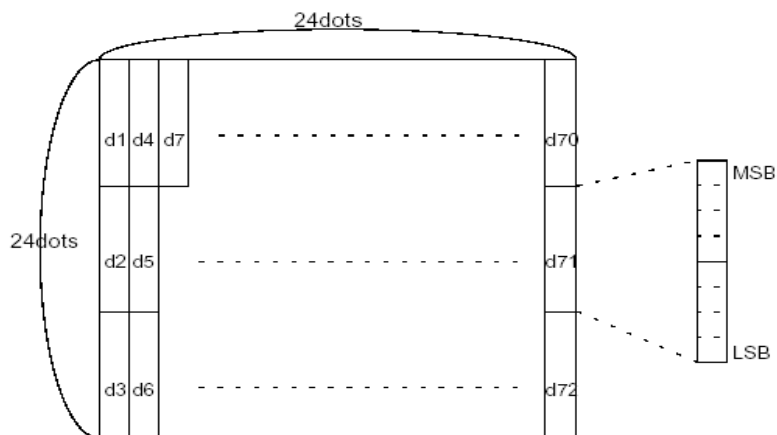
k = 72

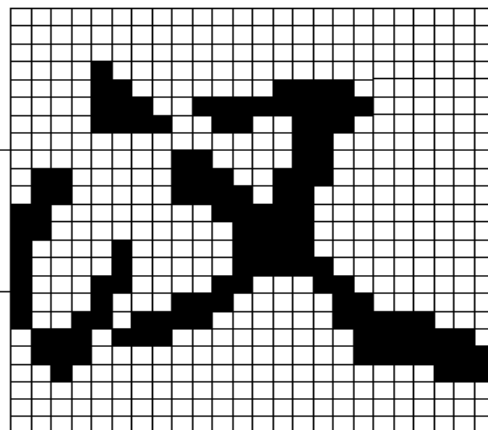
[Description] c1 and c2 indicate character codes for the defined characters. c1 specifies for the first byte, and c2 for the second byte. d indicates the dot data. Set a corresponding bit to 1 to print a dot or to 0 to not print a dot.

[Default] No user defined Chinese Kanji.

[Relative] FS C

The relationship between user-defined Chinese Kanji and data:





D1=00H, D4=00H, D7=00H, D10=00H,
D2=1FH, D5=78H, D8=60H, D11=00H,
D3=C0H, D6=30H, D9=38H, D12=70H,

FS S n1 n2

[Function] Set left-side and right-side Kanji character spacing

[Format]	ASCII	FS	S	n1	n2
	Hex	1C	53	n1	n2
	Decimal	28	83	n1	n2

[Range] $0 \leq n1 \leq 255$
 $0 \leq n2 \leq 255$

[Description] Sets left-side and right-side Kanji character spacing to n1 and n2 respectively.

When the printer model used supports **GS P**, the left-side character spacing is [n1 × horizontal or vertical motion units], and the right-side character spacing is [n2 × horizontal or vertical motion units].

[Notes] When double-width mode is set, the left-side and right-side character spacing is twice the normal value.

The horizontal and vertical motion units are set by **GS P**. The previously specified character spacing does not change, even if the horizontal or vertical motion unit is changed using **GS P**.

- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area as follows:

- 1) When the starting position is set to the upper left or lower right of the printable area, the horizontal motion unit (x) is used.
- 2) When the starting position is set to the upper right or lower left of the printable area, the vertical motion unit (y) is used.
- 3) The maximum Chinese Kanji spacing is approximately 36 mm. Any setting exceeding the maximum is converted to the maximum automatically.

[Default] n1 = 0, n2 = 0

[Relative] **GS P**

[Demo] Refers to **ESC SP**

FS W n

[Function] Turn quadruple-size mode on/off for Kanji characters

[Format]	ASCII	FS	W	n
	Hex	1C	57	n
	Decimal	28	87	n

[Range] $0 \leq n \leq 255$

[Description] · When the LSB of n is 0, quadruple-size mode for Kanji characters is turned off.
· When the LSB of n is 1, quadruple-size mode for Kanji characters is turned on.

[Notes] · Only the lowest bit of n is valid.
· In quadruple-size mode, the printer prints the same size characters as when double-width and double-height modes are both turned on.
· When quadruple-size mode is turned off using this command, the following characters are printed in normal size.
· When some of the characters on a line are different in height, all the characters on the line are aligned at the baseline.
· **FS !** or **GS !** can also select and cancel quadruple-size mode by selecting double-height and double-width modes, and the setting of the last received command is effective.

[Default] n = 0

[Relative] **FS !, GS !**

2.4 Bitmap Command

ESC * m nL nH d1... dk

[Function] Select bit-image mode

[Format]	ASCII	ESC * m nL nH d1...dk
	Hex	1B 2A m nL nH d1...dk
	Decimal	27 42 m nL nH d1...dk

[Range] m = 0, 1, 32, 33

$0 \leq nL \leq 255$

$0 \leq nH \leq 3$

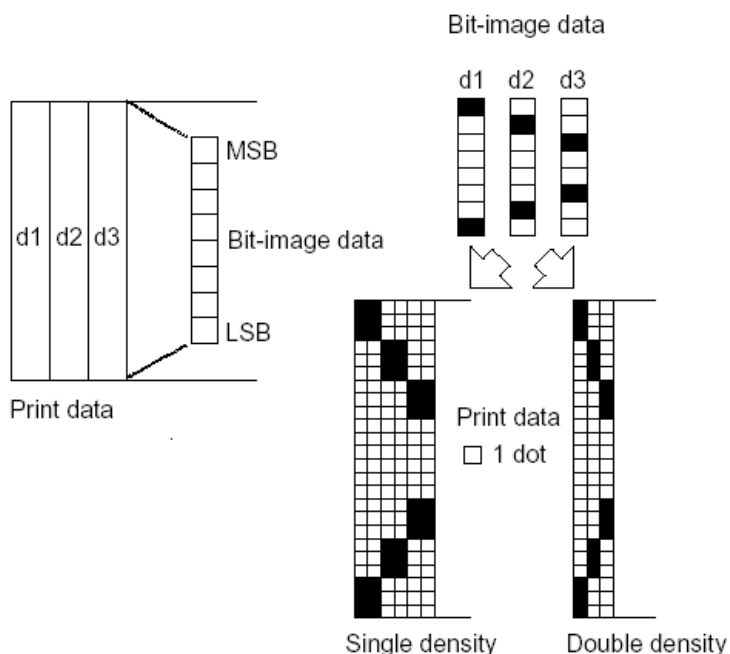
$0 \leq d \leq 255$

[Notes] Selects a bit-image mode using m for the number of dots specified by nL and nH, as follows:

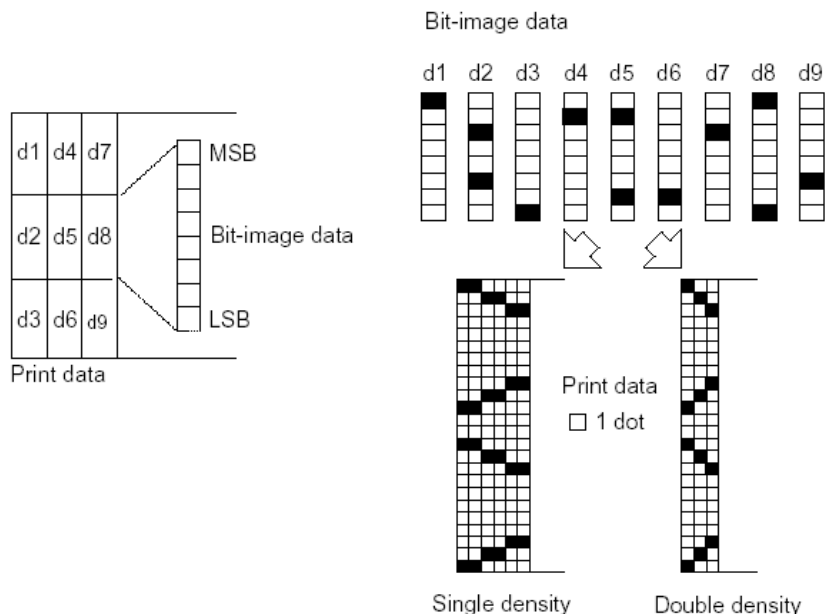
m	Mode	Vertical Direction	Horizontal Direction
---	------	--------------------	----------------------

		Number of Dots	Dot Density	Dot density	Number of Data (K)
0	8-dot single-density	8	203/3 DPI	101 DPI	$nL + nH \times 256$
1	8-dot double-density	8	230/3 DPI	203 DPI	$nL + nH \times 256$
32	24-dot single-density	24	203 DPI	101 DPI	$(nL + nH \times 256) \times 3$
33	24-dot double-density	24	203 DPI	203 DPI	$(nL + nH \times 256) \times 3$

- [Notes]**
- If the values of m is out of the specified range, nL and data following are processed as normal data.
 - The nL and nH indicate the number of dots of the bit image in the horizontal direction. The number of dots is calculated by $nL + nH \times 256$.
 - If the bit-image data input exceeds the number of dots to be printed on a line, the excess data is ignored.
 - d indicates the bit-image data. Set a corresponding bit to 1 to print a dot or to 0 to not print a dot.
 - After printing a bit image, the printer returns to normal data processing mode.
 - This command is not affected by print modes (emphasized, double-strike, underline, character size or white/black reverse printing), except upside-down printing mode.
 - The relationship between the image data and the dots to be printed is as follows:
 - When 8-dot bit image is selected:



When 24-dot bit image is selected:



ESC # n

[Function] Specify a number for the bit-image to be downloaded.

[Format]

ASCII	GS	#	n
Hex	1D	23	n
Decimal	29	35	n

[Range] $0 \leq n \leq 7$

[Description] Specifies a number for the bit-image to be downloaded. This number is to be used when downloading and printing this bit-image.

[Notes] The command is only enabled for bit-images in RAM and the settings are erased when the printer is turned off.

[Relative] **ESC 3**

GS * x y d1...d(x × y × 8)

[Function] Define downloaded bit image

[Format]

ASCII	GS	*	x y d1...d(x × y × 8)
Hex	1D	2A	x y d1...d(x × y × 8)
Decimal	29	42	x y d1...d(x × y × 8)

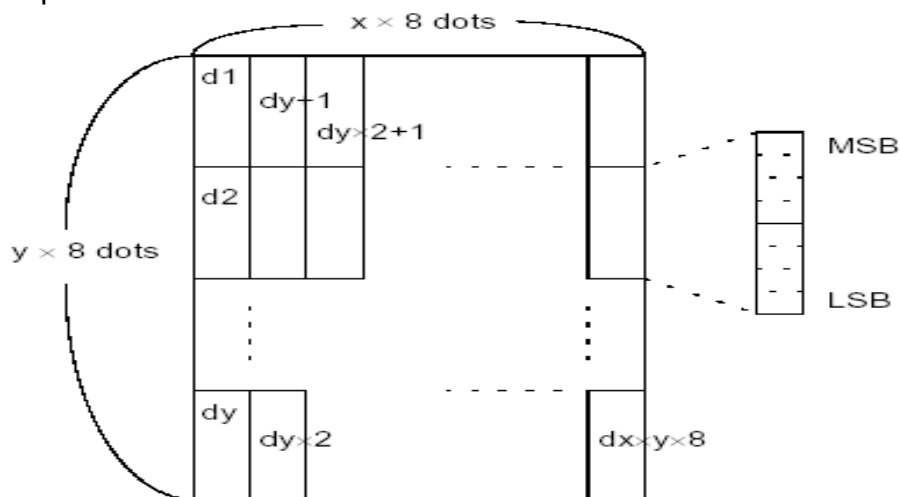
[Range]

- $1 \leq x \leq 255, 1 \leq y \leq 48$
- $x \times y \leq 912$
- $0 \leq d \leq 255$

[Description] Defines a downloaded bit image using the number of bytes specified by x and y.

- x specifies the number of dots in the horizontal direction.
- y specifies the number of dots in the vertical direction.
- The number of dots in the horizontal direction is $x \times 8$, in the vertical direction it's $y \times 8$.

- If $x \times y$ is out of the specified range, this command is disabled.
- The d indicates bit-image data. Data (d) specifies a bit printed to 1 and not printed to 0.
- The downloaded bit image definition is cleared when:
 - 1) Printer is reset or the power is turned off.
- The following figure shows the relationship between the downloaded bit image and the printed data.



[Relative] GS /

GS / m

[Function] Print downloaded bit image

[Format] ASCII GS / m
 Hex 1D 2F m
 Decimal 29 47 m

[Range] $0 \leq m \leq 3, 48 \leq m \leq 51$

[Description] Prints a downloaded bit image using the mode specified by m.
 m selects a mode from the table below:

m	Mode	Vertical Resolution (DPI)	Horizontal Resolution (DPI)
0, 48	Normal	203	203
1, 49	Double-width	203	101
2, 50	Double-height	101	203
3, 51	Quadruple	101	101

- [Notes]**
- This command is ignored if a downloaded bit image has not been defined.
 - In standard mode, this command is effective only when there is no data in the print buffer.
 - This command has no effect in the print modes (emphasized, double-strike, underline, character size, or white/black reverse printing), except for upside-down printing mode.
 - If the downloaded bit-image to be printed exceeds the printable area, the excess data is not printed.

- This command print bitmap in RAM but not in FLASH, the number of bitmap is defined by **GS #**.

[Relative] **GS ***, **GS #**

GS v 0 m xL xH yL yH d1....dk

[Function] Print raster bit image

[Format] ASCII GS v 0 m xL xH yL yH d1...dk
Hex 1D 76 30 m xL xH yL yH d1...dk
Decimal 29 118 48 m xL xH yL yH d1...dk

[Range] $0 \leq m \leq 3$, $48 \leq m \leq 51$

$0 \leq xL \leq 255$

$0 \leq xH \leq 255$

$0 \leq yL \leq 255$

$0 \leq d \leq 255$

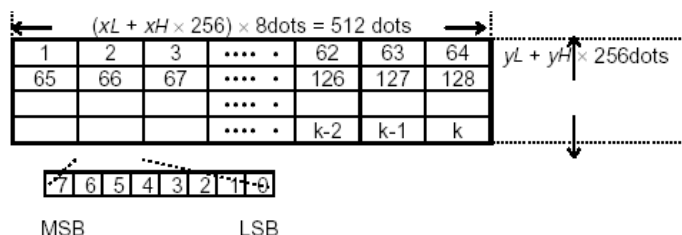
$k = (xL + xH \times 256) \times (yL + yH \times 256) (k \neq 0)$

[Notes] Selects Raster bit-image mode. The value of m selects the mode, as follows:

m	Mode	Vertical Resolution (DPI)	Horizontal Resolution (DPI)
0, 48	Normal	203 DPI	203 DPI
1, 49	Double-width	203 DPI	101 DPI
2, 50	Double-height	101 DPI	203 DPI
3, 51	Quadruple	101 DPI	101 DPI

- xL, xH indicate the number of data bytes ($xL + xH \times 256$) in the horizontal direction of the bit image.
- yL, yH indicate the number of data bytes ($yL + yH \times 256$) in the vertical direction of the bit image.
- In standard mode, this command is effective only when there is no data in the print buffer.
- This command has no effect in all print modes (character size, emphasized, double-strike, upside-down, underline, white/black reverse printing, etc.) for raster bit image.
- Data outside the printing area is discarded.
- The **ESC a** (Select justification) setting is also effective on raster bit images.
- When this command is received during macro definition, the printer ends macro definition, and begins performing this command. The definition of this command should be cleared.
- d indicates the bit-image data. Set a bit to 1 prints a dot and setting it to 0 does not print a dot.

[Demo] When $xL + xH \times 256 = 64$



FS p n m

[Function] Print NV bit image

[Format] ASCII FS p n m
Hex 1C 70 n m
Decimal 28 112 n m

[Range] $1 \leq n \leq 255$
 $0 \leq m \leq 3, 48 \leq m \leq 51$

[Notes] Prints a NV bit image n using the mode specified by m.

m	Mode	Vertical Resolution (DPI)	Horizontal Resolution (DPI)
0.48	Normal	203	203
1.49	Double-width	203	101
2.50	Double-height	101	203
3.51	Quadruple	101	101

- n is the number of the NV bit image (defined using the **FS q** command).
- m specifies the bit image mode.
 - NV bit image means a bit image which is defined in a non-volatile memory by **FS q** and printed by **FS p**.
 - This command is not effective when the specified NV bit image has not been defined.
 - In standard mode, this command is effective only when there is no data in the print buffer.
- This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated characters, etc.), except upside-down printing mode.
- If the downloaded bit-image to be printed exceeds one line, the excess data is not printed.
- After printing the bit image, this command sets the print position to the beginning of the line and processes the data that follows as normal data.

[Relatives] ESC *, FS q, GS /, GS v 0

FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n

[Function] Define Flash bit image

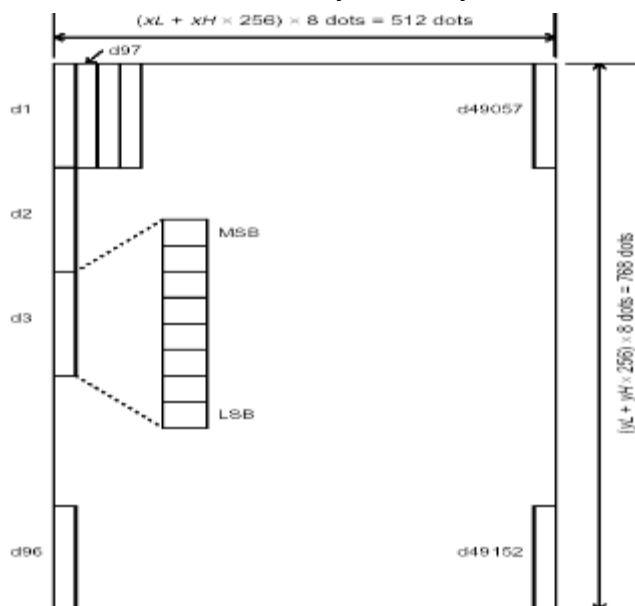
[Format] ASCII FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n
Hex 1C 71 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n

	Decimal 28 113 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n
[Range]	$1 \leq n \leq 255$ $0 \leq xL \leq 255$ $1 \leq (xL + xH \times 256) \leq 1023$ $1 \leq (yL + yH \times 256) \leq 8190$ $0 \leq d \leq 255$ $k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$
[Notes]	<ul style="list-style-type: none"> · Define the NV bit image specified by n. The max capacity of Flash is 256K(May be less than 256K according to different configuration). · n specifies the number of the defined NV bit image. · xL, xH specifies $(xL + xH \times 256) \times 8$ dots in the horizontal direction for the NV bit image you are defining. · yL, yH specifies $(yL + yH \times 256) \times 8$ dots in the vertical direction for the NV bit image you are defining. <ul style="list-style-type: none"> · Frequent write command execution may cause damage the NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day. · This command cancels all NV bit images that have already been defined by this command. The printer can not redefine only one of several data definitions previously defined. In this case, all data needs to be sent again. · Before the ending of the processing of this command mechanical operations (including initializing the position of the printer head when the cover is open, paper feeding by using the FEED button, etc.) cannot be performed, also sending command including real-time command is forbidden. <p>NV bit image means a bit image which is defined in a non-volatile memory by FS q and printed by FS p.</p> <ul style="list-style-type: none"> · In standard mode, this command is effective only when processed at the beginning of the line. · This 7 bytes <from FS~yH> is command data but not data of image. · When the amount of data exceeds the capacity left in the range defined by xL, xH, yL, yH, the printer processes xL, xH, yL, yH out of the defined range. · In the first group of NV bit images, when any of the parameters xL, xH, yL, yH is out of the definition range, this command is disabled. · In groups of NV bit images other than the first one, when the printer processes xL, xH, yL, yH out of the defined range, it stops processing this command. At this time, NV bit images that haven't been defined are disabled (undefined), but any NV bit images before that are enabled. · The d indicates the definition data. In data (d) a 1 bit specifies a dot to be printed and a 0 bit specifies a dot not to be printed.

- This command defines n as the number of a NV bit image. Numbers rise in order from NV bit image 01H. Therefore, the first data group [xL xH yL yH d1...dk] is NV bit image 01H, and the last data group [xL xH yL yH d1...dk] is NV bit image n. The total agrees with the number of NV bit images specified by command FS p.
- A definition data of a NV bit image consists of [xL xH yL yH d1...dk]. Therefore, when only one NV bit image is defined n=1, the printer processes a data group [xL xH yL yH d1...dk] once. The printer uses $([data: (xL + xH \times 256) \times (yL + yH \times 256) \times 8] + [header:4])$ bytes of NV memory.
- The download area in Flash of this printer is a maximum of 64K bits (8K bytes). This command can define several NV bit images, but cannot define a bit image data whose total capacity [bit image data + header] exceeds 64K bits (The download area is different according to different configuration).
- The printer is busy immediately before writing into Flash.
- When this command is received during macro definition, the printer ends macro definition, and begins performing this command.
- Once a NV bit image is defined, it is not erased by performing **ESC @**, reset, and power off.
- This command performs only definition of a NV bit image and does not perform printing. Printing of the NV bit image is performed by the **FS p** command.

[Relative] FS p

[Demo] When xL = 64, xH = 0, yL = 96, yH = 0



2.5 Status command

DLE EOT n

[Function] Real-time status transmission

[Format]

	ASCII	DLE	EOT	n
Hex		10	04	n
Decimal		16	4	n

[Range] $1 \leq n \leq 4$

- n = 1: Transmit printer status
- n = 2: Transmit off-line status
- n = 3: Transmit error status
- n = 4: Transmit paper roll sensor status

[Description] Transmits the selected printer status specified by n in real-time.

[Notes]

- Even though the printer is not selected using **ESC** = (select peripheral device), this command is effective.
- The printer transmits the current status. Each status is represented by one-byte data.
- The printer transmits the status without confirming whether the host computer can receive data.
- The printer executes this command upon receiving it.
- This command is effective to serial, bi-direction parallel and USB printer. This command is executed in any status.

n = 1: Printer status

Bit	0/1	Hex	Decimal	Function
0	0	00	0	Not used. Fixed to 0
1	1	02	2	Not used. Fixed to 1
2	0	00	0	1 or 2 drawer is open
	1	04	4	2 drawers are closed
3	0	00	0	On-line.
	1	08	8	Off-line
4	1	10	16	Not used. Fixed to 1
5,6				Undefined
7	0	00	00	Not used. Fixed to 0.

n = 2: Off-line status

Bit	0/1	Hex	Decimal	Function
0	0	00	0	Not used. Fixed to 0
1	1	02	2	Not used. Fixed to 1
2	0	00	0	Cover is closed.
	1	04	4	Cover is open
3	0	00	0	FEED button is not been pushed
	1	08	8	FEED button is been pushed
4	1	10	16	Not used. Fixed to 1
5	0	00	0	Paper is not end
	1	20	32	Paper is end

6	0	00	0	No error.
	1	40	64	Error occurs
7	0	00	0	Not used. Fixed to 0

n = 3: Error status

Bit	0/1	Hex	Decimal	Function
0	0	00	0	Not used. Fixed to 0
1	1	02	2	Not used. Fixed to 1
2	-	-	-	Undefined
3	0	00	0	No auto-cutter error
	1	08	8	Auto-cutter error occurs.
4	1	10	16	Not used. Fixed to 1
5	0	00	00	Not used. Fixed to 0
6	0	00	0	Temperature of printhead is normal
	1	40	64	Temperature of printhead is abnormal
7	0	00	0	Not used. Fixed to 0

n = 4: Paper feeding status

Bit	0/1	Hex	Decimal	Function
0	0	00	0	Not used. Fixed to 0
1	1	02	2	Not used. Fixed to 1
2,3	0	00	0	Non-paper near status
	1	0C	12	Paper near end status
4	1	10	16	Not used. Fixed to 1
5,6	0	00	0	Paper present
	1	60	96	Paper end
7	0	00	0	Not used. Fixed to 0

Please avoid to insert this command between 2 or more byte command.

For Example :

In the process of sending **ESC 3 n** to printer, DTR become to MARK(DSR is used to host) before sending n and **DLE EOT 3** interrupted before receiving n, then the printer take code<10>H of **DLE EOT 3** as code <10>H of **ESC 3**.

[Relative] **DLE ENQ, GS a, GS r**

GS a n

[Function] Enable/Disable Automatic Status Back (ASB)

[Format] ASCII GS a n

Hex 1D 61 n

Decimal 29 97 n

[Range] $0 \leq n \leq 255$

[Notes] Enables or disables ASB and specifies the status items to include. The return information are as follows:

- When n is not equal to 0, the printer automatically transmits the status whenever the enabled status item changes.

- When n is equal to 0, the ASB function is ineffective.
- The following four status bytes are transmitted without confirming whether the host is ready to receive data.
- This command is executed with other command in turns, so there will have some time delay between sending command and setting ASB is available.
- Even the printer is disabled by ESC = (Select peripheral device), the four status bytes are transmitted whenever the status changes.

First byte(Printer information)

Bit	Off/On	Hex	Decimal	Printer status
0	Off	00	0	Not used. Fixed to 0.
1	Off	00	0	Not used. Fixed to 0.
2	Off	00	0	Drawer kick-out connector pin 3 is LOW.
	On	04	4	Drawer kick-out connector pin 3 is HIGH.
3	Off	00	0	On-line.
	On	08	8	Off-line.
4	On	10	16	Not used. Fixed to 1.
5	Off	00	0	Cover is closed.
	On	20	32	Cover is open.
6	Off	00	0	Paper is not being fed by using the PAPER FEED button.
	On	40	64	Paper is being fed by using the PAPER FEED button.
7	Off	00	0	Not used. Fixed to Off.

Second byte (printer information)

Bit	Off/On	Hex	Decimal	Printer Status
0	-	-	-	Undefined.
1	-	-	-	Undefined.
2	-	-	-	Undefined.
3	Off	00	0	No auto cutter error.
	On	08	8	Auto cutter error occurred.
4	Off	00	0	Not used. Fixed to Off.
5	Off	00	0	No recoverable error.
	On	20	32	Recoverable error occurred.
6	Off	00	0	No automatically recoverable error.
	On	40	64	Automatically recoverable error occurred.
7	Off	00	0	Not used. Fixed to Off.

Bit 5: If these errors occur due to paper jams or the like, it is possible to recover by correcting the cause of the error and executing **DLE ENQ n** ($1 \leq n \leq 2$). If an error due to a main control board failure (e.g. wire break) occurs, it is impossible to recover.

Bit 6: When printing is stopped due to high print head temperature until the print head temperature drops sufficiently.

Third byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Printer Status
0,1	Off	00	0	Paper is not near end

	On	03	3	Paper near end.
2,3	Off	00	0	Paper present
	On	0C	12	Paper end
4	Off	00	0	Not used. Fixed to Off.
5,6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

Fourth byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status for ASB
0-3	-	-	-	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5,6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

GS r n

[Function] Transmit status

[Format] ASCII GS r n

Hex 1D 72 n

Decimal 29 114 n

[Range] n = 1, 2, 49, 50

[Description] Transmits the status specified by n as follows:

n	Function
1, 49	Transmits paper sensor status
2, 50	Transmits drawer kick-out connector status

- [Notes]**
- This command is valid for serial, bi-direction parallel and USB printer only,
 - This command is executed when the data in the receive buffer is processed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.
 - The status types to be transmitted are shown below:

Paper sensor status (n = 1, 49):

Bit	Off/On	Hex	Decimal	Status for ASB
0, 1	Off	00	0	Paper near-end sensor: paper adequate
	On	03	3	Paper near-end sensor: paper near end
2, 3	Off	00	0	Paper end sensor: paper adequate
	On	0c	12	Paper end sensor: paper end
4	Off	00	0	Not used. Fixed to Off
5,6				Undefined
7	Off	00	0	Not used. Fixed to Off

Drawer kick-out connector status (n = 2, 50):

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Drawer kick-out is open
	On	01	1	Drawer kick-out is closed

1- 3				Undefined
4	Off	00	0	Not used. Fixed to Off
5,6				Undefined
7	Off	00	0	Not used. Fixed to Off.

[Relative] DLE EOT, GS a

2.6 Barcode command

GS H n

[Function] Select printing position for HRI characters

[Format] ASCII GS H n
Hex 1D 48 n
Decimal 29 72 n

[Range] $0 \leq n \leq 3, 48 \leq n \leq 51$

[Description] Selects the printing position of HRI characters when printing a barcode.
n selects the printing position as follows:

n	Printing position
0, 48	Not printed
1, 49	Above the bar code
2, 50	Below the bar code
3, 51	Both above and below the bar code

[Notes] · HRI indicates Human Readable Interpretation.
· HRI characters are printed using the font specified by GS f.

[Default] n = 0

[Relative] GS f, GS k

GS f n

[Function] Select font for Human Readable Interpretation (HRI) characters

[Format] ASCII GS f n
Hex 1D 66 n
Decimal 29 102 n

[Range] n = 0, 1, 48, 49

[Description] Selects a font for the HRI characters used when printing a bar code.
n selects a font from the following table:

n	Font
0,48	Font A (12 × 24)
1,49	Font B (9 × 17)

[Notes] · HRI indicates Human Readable Interpretation.
· HRI characters are printed at the position specified by GS H.

[Default] n = 0

[Relative] **GS H, GS k**

GS h n

[Function] Select barcode height

[Format] ASCII GS h n
 Hex 1D 68 n
 Decimal 29 104 n

[Range] $1 \leq n \leq 255$

[Description] Selects the height of the barcode.

n specifies the number of dots in the vertical direction.

[Default] n = 162

[Relative] **GS k**

①**GS k m d1...dk NUL** ②**GS k m n d1...dn**

[Function] Select a barcode type and print barcode

[Format] ①ASCII GS k m d1...d k NUL
 Hex 1D 6B m d1...d k 00
 Decimal 29 107 m d1...d k 0
 ②ASCII GS k m n d1... dn
 Hex 1D 6B m n d1... dn
 Decimal 29 107 m n d1... dn

[Range] ① $0 \leq m \leq 6$, m = 10 (k and d depends on the barcode system used)

② $65 \leq m \leq 73$, m = 75 (n and d depends on the barcode system used)

[Notes] Selects a barcode type and prints the bar code.

m selects a bar code type as follows:

m	Bar Code type	Number of Characters	Remarks
①	0	UPC-A	$11 \leq k \leq 12$ $48 \leq d \leq 57$
	1	UPC-E	$11 \leq k \leq 12$ $48 \leq d \leq 57$, d1=48
	2	JAN13 (EAN13)	$12 \leq k \leq 13$ $48 \leq d \leq 57$
	3	JAN 8 (EAN8)	$7 \leq k \leq 8$ $48 \leq d \leq 57$
	4	CODE39	$1 \leq k \leq 255$ $45 \leq d \leq 57$, $65 \leq d \leq 90$, 32, 36, 37,43
	5	ITF	$1 \leq k \leq 255$ $48 \leq d \leq 57$
	6	CODABAR	$1 \leq k \leq 255$ $48 \leq d \leq 57$, $65 \leq d \leq 68$, 36, 43, 45,46,47,58
	10	PDF 417	$1 \leq k \leq 255$ $32 \leq d \leq 255$
②	65	UPC-A	$11 \leq n \leq 12$ $48 \leq d \leq 57$
	66	UPC-E	$11 \leq n \leq 12$ $48 \leq d \leq 57$
	67	JAN13 (EAN13)	$12 \leq n \leq 13$ $48 \leq d \leq 57$
	68	JAN 8 (EAN8)	$7 \leq n \leq 8$ $48 \leq d \leq 57$
	69	CODE39	$1 \leq n \leq 255$ $45 \leq d \leq 57$, $65 \leq d \leq 90$, 32, 36, 37,43
	70	ITF	$1 \leq n \leq 255$ $48 \leq d \leq 57$

71	CODABAR	$1 \leq n \leq 255$	$48 \leq d \leq 57$ $65 \leq d \leq 68$, 36, 43,45,46,47 58
72	CODE93	$1 \leq n \leq 255$	$0 \leq d \leq 127$
73	CODE128	$2 \leq n \leq 255$	$0 \leq d \leq 127$
75	PDF417	$1 \leq n \leq 255$	$0 \leq d \leq 255$

[Notes ①]

- This command ends with a NULL code.
- When UPC-A or UPC-E selected, printer ignores the following data after receiving 12 bytes of barcode data.
- When JAN13 (EAN13) selected, printer ignores the following data after receiving 13 bytes of barcode data.
- When JAN8 (EAN8) selected, printer ignores the following data after receiving 13 bytes of barcode data.
- The number of data for ITF bar code must be even numbers. When an odd number of data is input, the printer ignores the last received data.
- The beginning code and the ending code of CODEBAR barcode must be one of A, B, C and D. The ending codes can use T, E, * and N to ends.

[Notes ②]

- n indicates the number of barcode data, and the printer processes n bytes from the next character data as barcode data.
- If n is outside of the specified range, the printer stops command processing and processes the following data as normal data.

[Notes (standard mode)]

- If d is outside of the specified range, the command is ignored.
- If the horizontal size of the barcode exceeds printing area, the command is ignored.
- This command feeds as much paper as is required to print the barcode, regardless of the line spacing specified by **ESC 2** or **ESC 3**.
- This command is enabled only when no data exists in the print buffer. When data exists in the print buffer, the command is ignored.
- After printing barcode, this command sets the print position to the beginning of the line.
- This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated character, etc.), except for upside-down printing mode.

[Notes in page mode]

- This command develops bar code data in the print buffer, but does not print it. After processing barcode data, this command moves the print position to the right side dot of the barcode.

- If d is out of the specified range, the printer stops command processing and processes the following data as normal data.
- If barcode width exceeds the printing area, the printer does not print the barcode.

When CODE128 (m = 73) is used:

- Refer to Appendix A for the information of the CODE 128 barcode and its code table.
- When using the CODE 128 in this printer, take the following points into account for data transmission:
 - 1)The top of the bar code data string must be code set selection character (any of CODE A, CODE B or CODE C) which selects
 - 2)Special characters are defined by combining two characters "{" and one character. The ASCII character "{" is defined by transmitting "{" twice consecutively.

Specific character	Transmit data		
	ASCII	Hex	Decimal
SHIFT	{S	7B, 53	123, 83
CODE A	{A	7B, 41	123, 65
CODE B	{B	7B, 42	123, 66
CODE C	{C	7B, 43	123, 67
FNC1	{1	7B, 31	123, 49
FNC2	{2	7B, 32	123, 50
FNC3	{3	7B, 33	123, 51
FNC4	{4	7B, 34	123, 52
"{"	{{	7B, 7B	123, 123

[Demo] Example data for printing "No. 123456"

In this example, the printer first prints "No." using CODE B, then prints the following numbers using CODE C.

GS k 73 10 123 66 78 111 46 123 67 12 34 56



- If the top of the barcode data is not the code set selection character, the printer stops command processing and ignore the following data.

- If combination of "{" and the following character does not apply any special character, the printer stops command processing and ignore the following data.
- If the printer receives characters that cannot be used in the special code set, the printer stops command processing and ignore the following data.
- The printer does not print HRI characters that correspond to the shift characters or code set selection characters.
- HRI character for the function character are not printed.
- HRI characters for the control character (<00>H to <1F>H and <7F>H) are not printed.

[Relative] **GS H, GS f, GS h, GS w, Appendix A**

[Notes] **1B 40** (Initialize printer)

4A 41 4E 31 33 0A

1D 48 01 (Set the width of the barcode unit 1)

1D 66 01 (HRI character use condensed character)

1D 77 01 (HRI character print above the barcode)

1D 68 40 (Barcode height is 64/203 inch)

1D 6B 02 30 31 32 33 34 35 36 37 38 39 30 35 39 00 0A

1D 48 02 (Set the width of the barcode unit 2)

1D 66 01 (HRI character use condensed character)

1D 77 02 (HRI character print under the barcode)

1D 68 80 (Barcode height is 128/203 inch)

1D 6B 02 30 31 32 33 34 35 36 37 38 39 30 35 39 00 0A

1D 48 03 (Set the width of the barcode unit 3)

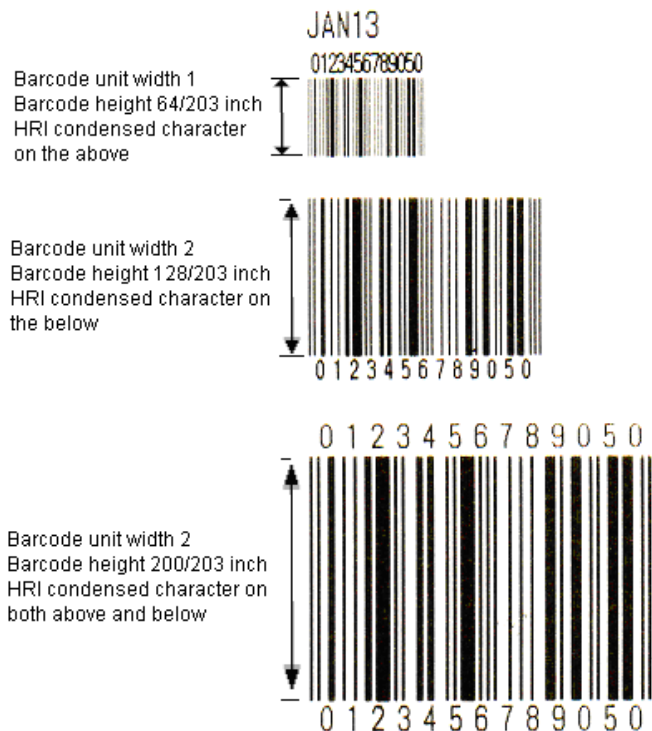
1D 66 00 (HRI character use standard character)

1D 77 03 (HRI character print both above and under the barcode)

1D 68 C8 (Barcode height is 162/203 inch)

1D 6B 02 30 31 32 33 34 35 36 37 38 39 30 35 39 00 0A

Result:



GS p n

[Function] Set barcode parameter of barcode PDF417

[Format] ASCII GS p nA nB nC nD nE nF
Hex 1D 70 nA nB nC nD nE nF
Decimal 29 112 nA nB nC nD nE nF

[Range] $1 \leq nA \leq 10$, $1 \leq nB \leq 100$, $3 \leq nC \leq 90$, $1 \leq nD \leq 30$, $1 \leq nE \leq 7$, $2 \leq nF \leq 25$

[Description] The meaning of parameter n is shown as below:

Parameter	Meaning
nA	Appearance to height
nB	Appearance to width
nC	Lines limit
nD	Columns limit
nE	Basic element width
nF	Basic element height

GS q n

[Function] Set correction grade of barcode PDF417

[Format] ASCII GS q n
Hex 1D 71 n
Decimal 29 113 n

[Range] $0 \leq n \leq 8$

[Notes] Set correction grade of PDF417 code, the higher the correction grade is the bigger the capacity of the barcode is.

GS w n

[Function] Set bar code width

[Format]

ASCII	GS	w	n
Hex	1D	77	n
Decimal	29	119	n

[Range] $2 \leq n \leq 6$

[Description] Set the horizontal size of the barcode.

n specifies the bar code width as follows:

n	Module Width (mm) for Single-level Barcode	Binary-level Barcode	
		Thin element width (mm)	Thick element width (mm)
2	0.25	0.25	0.625
3	0.375	0.375	1.0
4	0.5	0.5	1.25
5	0.625	0.625	1.625
6	0.75	0.75	1.875

- Single-level bar codes are as follows:
UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), CODE93, CODE128
- Binary-level bar codes are as follows:
CODE39, ITF, CODABAR

[Default] n = 2

[Relative] GS k

2.7 Other commands

DLE ENQ n

[Function] Real-time request to printer

[Format]

ASCII	DLE	ENQ	n
Hex	10	05	n
Decimal	16	5	n

[Range] $1 \leq n \leq 2$

[Note] n specifies the requests as follows:

n	Request
1	Recover from an error and restart printing from the line where the error occurred
2	Recover from an error after clearing the receive and print buffers

- This command is effective only when an auto-cutter error occurs or printer can not find print mark.
- The printer starts processing data upon receiving this command under serial mode.

- With a parallel interface model, this command can not be executed when the printer is busy.
- When the printer is disabled with **ESC =** (Select peripheral device), the command is still available.
- Do not insert the command into the data sequence of over 2 or more bytes.

[Relative] DLE EOT

DLE DC4 n m t

[Function] Generate pulse at real-time to open cash drawer

[Format]

ASCII	DLE	DC4	n	m	t
Hex	10	14	n	m	t
Decimal	16	20	n	m	t

[Range]

n = 1

m = 0, 1

1 ≤ t ≤ 6

[Description] Outputs the pulse specified by t to connector pin m as follows:

m	Connector pin
0	Drawer kick-out connector pin 2
1	Drawer kick-out connector pin 5

The pulse ON time is [t × 100 ms] and the OFF time is [t × 100ms].

- [Notes]**
- When the pulse is output to the connector pin specified while **ESC p** or **DEL DC4** is executed while this command is processed, this command is ignored.
 - The printer executes this command upon receiving it with a serial interface model.
 - this command cannot be executed when the printer is busy with a parallel interface model.
 - If print data includes the same character strings as this command, the printer performs the same operation specified by this command. The user must consider this.
 - This command is effective even when the printer is disabled with **ESC =** (Select peripheral device).
 - Do not insert the command into the data sequence of over 2 or more bytes.

[Relative] ESC p

ESC 2

[Function] Select default line spacing

[Format]

ASCII	ESC	2
Hex	1B	32
Decimal	27	50

[Notes] · The line spacing can be set independently in standard mode and in page mode.

[Relative] **ESC 3**

ESC 3 n

[Function] Set line spacing

[Format]

ASCII	ESC	3	n
Hex	1B	33	n
Decimal	27	51	n

[Range] $0 \leq n \leq 255$

[Description] Sets the line spacing to [n × vertical or horizontal motion unit] inches.

[Notes]

- The line spacing can be set independently in standard mode and in page mode.
- The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current line spacing.
- In standard mode, the vertical motion unit (y) is used.
 - In page mode, this command functions as follows, depending on the starting position of the printable area:
 - 1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used.
 - 2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the horizontal motion unit (x) is used.
 - The maximum paper feed amount is 1016 mm (40 inches). Even if a paper feed amount of more than 1016 mm (40 inches) is set, the printer feeds the paper only 1016 mm (40 inches).

[Default] Line spacing equivalent to approximately 4.23mm (1/6 inches).

[Relative] **ESC 2, GS P**

ESC = n

[Function] Set peripheral device

[Format]

ASCII	ESC	=	n
Hex	1B	3D	n
Decimal	27	61	n

[Range] $0 \leq n \leq 1$

[Description] Selects device to which host computer sends data, using n as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Printer disabled
	On	01	1	Printer enabled
1-7				Undefined

[Notes] · When the printer is disabled, it ignores all data except for error-recovery commands (**DLE EOT**, **DLE ENQ**, **DLE DC4**) until it is enabled by this command.

[Default] n = 1

ESC @

[Function] Initialize printer

[Format]	ASCII	ESC	@
	Hex	1B	40
	Decimal	27	64

- [Notes]**
- The data in the receive buffer is not cleared.
 - The macro definition is not cleared.
 - The NV bit image data is not cleared.

ESC L

[Function] Select page mode

[Format]	ASCII	ESC	L
	Hex	1B	4C
	Decimal	27	76

- [Notes]**
- This command is enabled only when processed at the beginning of a line in standard mode.
 - This command has no effect in page mode.
 - After printing by **FF** is completed or by using **ESC S**, the printer returns to standard mode.
 - This command sets the position where data is buffered to the position specified by **ESC T** within the printing area defined by **ESC W**.
 - This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for page mode:
 - 1) Set right-side character spacing: **ESC SP, FS S**
 - 2) Select default line spacing: **ESC 2, ESC 3**
 - Only indication bit can be changed in page mode; switch to standard mode are not executed.
 - 1) Turn 90° clockwise rotation mode on/off: **ESC V**
 - 2) Select justification: **ESC a**
 - 3) Turn upside-down printing mode on/off: **ESC {**
 - 4) Set left margin: **GS L**
 - 5) Set printable area width: **GS W**
 - The printer returns to standard mode when power is turned on, the printer is reset, or **ESC @** is used.

[Relative] **FF, CAN, ESC FF, ESC S, ESC T, ESC W, GS \$, GS **

ESC S

[Function] Select standard mode

[Format]	ASCII	ESC	S
-----------------	-------	-----	---

Hex	1B	53
Decimal	27	83

- [Notes]**
- This command is effective only in page mode.
 - Data buffered in page mode are cleared.
 - This command sets the print position to the beginning of the line.
 - The page area are initialized as default data.
 - This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for standard mode:
 - 1) Set right-side character spacing: **ESC SP, FS S**
 - 2) Select default line spacing: **ESC 2, ESC 3**
 - The following commands are enabled only to set in standard mode.
 - 1) Set printing area in page mode: **ESC W**
 - 2) Select print direction in page mode: **ESC T**
 - The following commands are ignored in standard mode.
 - 1) Set absolute vertical print position in page mode: **GS \$**
 - 2) Set relative vertical print position in page mode: **GS **
 - Standard mode is selected automatically when power is turned on, the printer is reset, or command **ESC @** is used.

[Relative] **FF, ESC FF, ESC L**

ESC c 0 n

[Function] Selects the paper type

[Format]	ASCII	ESC	c	0	n
	Hex	1B	63	30	n
	Decimal	27	99	40	n

[Range] $0 \leq n \leq 2$

[Notes] Selects the paper type

- n = 0, set paper type as continuous paper roll.
- n = 1, set paper type as Marked paper.
- Marked paper is the paper with black marks.
- Never use marked continuous paper when paper type is set to paper, otherwise **GS FF** command will cause the printer feeding too long. Never use marked paper when paper type is set to continuous paper, otherwise printer will alarm paper end.

[Default] n = 0

[Relative] **GS FF**

ESC c 3 n

[Function] Select paper sensor(s) to output paper end signals

[Format]	ASCII	ESC	c	3	n
	Hex	1B	63	33	n
	Decimal	27	99	51	n

[Range] $0 \leq n \leq 255$

[Note] · Each bit of n is used as follows:

Bit	0/1	Hex	Decimal	Function
0	0	00	0	Paper near end send is disabled
	1	01	1	Paper near end send is enabled
1	0	00	0	Paper near end send is disabled
	1	02	2	Paper near end send is enabled
2	0	00	00	Paper near end send is disabled
	1	04	4	Paper near end send is enabled
3	0	00	00	Paper near end send is disabled
	1	08	8	Paper near end send is enabled
4-7				Undefined

- It is possible to select two sensors to output signals. Then, if any of the sensors detects a paper end, the paper end signal can output.
- The command is available only with a parallel interface and is ignored with a serial interface.
- If either bit 0 or bit 1 is on (value is 1), the paper near-end sensor is selected as the paper sensor outputting paper-end signals.
- If either bit 2 or bit 3 is on (value is 1), the paper end sensor is selected as the paper sensor outputting paper-end signals
- When two sensors are disabled, the paper end signal always outputs a paper present status.

[Default] n = 12

ESC c 4 n

[Function] Select paper sensor(s) to stop printing

[Format] ASCII ESC c 4 n
Hex 1B 63 34 n
Decimal 27 99 52 n

[Range] $0 \leq n \leq 255$

[Notes] n is defined as below:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper near end sensor disabled
	On	01	1	Paper near end sensor enabled
1	Off	00	0	Paper near end sensor disabled
	On	02	2	Paper near end sensor enabled
2-7				Undefined

- When either bit 0 or 1 is on, paper near-end sensor enabled, and it stops printing after printer the current task.

[Default] n = 0

ESC c 5 n

[Function] Enable/disable panel buttons

[Format]

ASCII	ESC	c	5	n
Hex	1B	63	35	n
Decimal	27	99	53	n

[Range] $0 \leq n \leq 255$

[Notes]

- When the lowest bit of n is 0, the panel buttons are enabled.
- When the lowest bit of n is 1, the panel buttons are disabled.
- Only the lowest bit of n is valid.
- When the panel buttons are disabled, none of them are usable when pressed.
- When execute macro commands, the FEED button is always enabled.

[Default] n = 0

ESC p m t1 t2

[Function] Outputs the pulse specified by t1 and t2 to connector pin

[Format]

ASCII	ESC	p	m	t1	t2
Hex	1B	70	m	t1	t2
Decimal	27	112	m	t1	t2

[Range] m = 0, 1, 48, 49
 $0 \leq t1 \leq 255, 0 \leq t2 \leq 255$

[Notes]

m	Connector pin
0, 48	Drawer kick-out connector pin 2
1, 49	Drawer kick-out connector pin 5

- The pulse ON time is $[t1 \times 2 \text{ ms}]$ and the OFF time is $[t2 \times 2 \text{ ms}]$.
- If $t2 < t1$, the OFF time is $[t1 \times 2 \text{ ms}]$.

[Relative] DLE DC4

GS FF

[Function] Feed label to print position

[Format]

ASCII	GS	FF
Hex	1D	0C
Decimal	29	12

[Notes]

- This Command is valid only when the paper type is set to marked paper.
- Never use continuous paper when paper type is set to marked paper, otherwise GS FF command will cause the printer feeding too long.
- When paper type is set to mark paper, send two or more than two commands the printer only orient mark position once.

[Relative] ESC c 0

GS (A pL pH n m

[Function]	Execute test print
[Format]	ASCII GS (A pL pH n m Hex 1D 28 41 pL pH n m Decimal 29 40 65 pL pH n m
[Range]	$(pL + (pH \times 56)) = 2$ ($pL=2, pH=0$) $0 \leq n \leq 2, 8 \leq n \leq 50$ $1 \leq m \leq 3, 9 \leq m \leq 51$
[Notes]	m specifies a test pattern.

m	Printer contents
1, 49	Hexadecimal dump print
2, 50	Printer internal configuration information print
3, 51	Cyclic character print
4, 52	Printer checkout

- This command is enabled only when processed at the beginning of a line in standard mode.
- This command is no effect in page mode.
- When this command is received during macro definition, the printer ends macro definition and begins performing this command.
- After the test print is finished, the printer resets itself automatically.
- After executed this command, printer cut paper automatically.
- The printer goes BUSY while this command is executed, therefore printer do not receive any command.

GS :

[Function]	Start/end macro definition
[Format]	ASCII GS : Hex 1D 3A Decimal 29 58

- [Notes]**
- Macro definition starts when this command is received during normal operation. Macro definition ends when this command is received during macro definition.
 - When **GS ^** is received during macro definition, the printer ends macro definition and clears the definition.
 - Macro is not defined when the power is turned on.
 - The defined contents of the macro are not cleared by **ESC @**. Therefore, **ESC @** can be included in the contents of the macro definition.
 - The contents of the macro can be defined up to 2048 bytes. If the macro definition exceed 2048 bytes, excess data will be process as normal data.

[Relative] **GS ^**

①GS V m ②GS V m n

[Function] Select cut mode and cut paper

[Format]

①ASCII	GS	V	m
Hex	1D	56	m
Decimal	29	86	m
②.ASCII	GS	V	m n
Hex	1D	56	m n
Decimal	29	86	m n

[Range]

① m = 0, 48, 1, 49

② m = 66, $0 \leq n \leq 255$

[Notes] Selects a mode for cutting paper and executes paper cutting. The value of m selects the mode as follows:

m	Cut mode
0,48	Full cut
1,49	Partial cut
66	Feeds paper (cutting position + [n × (vertical motion unit)]), and cuts the paper partially.

[Notes ①] · This command is effective only processed at the beginning of a line.

[Note ②]

- This command is effective only processed at the beginning of a line.
- When = 0, 48, 1, 49, the printer cut paper directly.
- When = 66, the printer feeds the paper to (cutting position + [n × vertical motion unit]) and cuts it.
- The horizontal and vertical motion unit are specified by **GS P**
- Paper feed amount is accounted by portrait moving unit.

GS ^ r t m

[Function] Execute macro

[Format]

ASCII	GS	^	r	t	m
Hex	1D	5E	r	t	m
Decimal	29	94	r	t	m

[Range]

$0 \leq r \leq 255$

$0 \leq t \leq 255$

m = 0, 1

[Description] Executes a macro.

- r specifies the number of times to execute the macro.
- t specifies the waiting time for executing the macro.
- m specifies macro executing mode.

When the LSB of $m = 0$:

The macro executes r times continuously at the interval specified by t .

When the LSB of $m = 1$:

After waiting for the period specified by t , the PAPER OUT LED indicators blink, and the printer waits for the FEED button to be pressed. After the button is pressed, the printer executes the macro once. The printer repeats the operation r times.

- [Notes]**
- The waiting time is $t \times 100$ ms for every macro execution.
 - If this command is received while a macro is being defined, the macro definition is aborted and the definition is cleared.
 - If the macro is not defined or if r is 0, nothing is executed.
 - When the macro is executed ($m = 1$), paper always cannot be fed by using the FEED button.

[Relative] GS :

GS { w

[Name] Enable/Disable watermark mode

[Format] ASCII GS { w n

Hex 1D 7B 77 n

Decimal 29 123 119 n

[Range] $n = 0 \sim 1$.

[Description] $n = 0$: Enable watermark mode;

$n = 1$: Disable watermark mode.

- [Note]**
- This command should be used at the beginning of the line, otherwise it is not effective.
 - Please use GS { w f to define the bitmap before using this command.
 - When disable watermark mode using this command, the printer recovers to the normal print mode.

GS { w f

[Name] Set watermark bitmap parameters and enter watermark mode.

[Format] ASCII GS { w f n1 n2 n3 n4 n5

Hex 1D 7B 77 02 n1 n2 n3 n4 n5

Decimal 29 123 119 02 n1 n2 n3 n4 n5

[Range] $n1 = 0 \sim 1$;

$n2 = 0 \sim 1 \sim 2$;

$n3$, using the value in figure 1

[Description] • $n1$ specifies watermark printing mode:

0 : To print watermark when paper feed

1: To print watermark when print start

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- n2 specifies watermark aligning mode:
 - 0: Align to left side
 - 1: Centralized
 - 2: Align to right side

- n3 specifies Watermark enlargement option shown as figure 1:

Bit	0/1	Hex	Decimal	Function
0-3				Watermark height option (Refer to Figure2)
4-7				Watermark width option (Refer to Figure2)

Watermark height option			Watermark width option		
Hex	Decimal	Horizontal	Hex	Decimal	Vertical
10	16	1 (Normal)	01	1	1 (Normal)
20	32	2 (Double width)	02	2	2 (Double height)
30	48	3	03	3	3
40	64	4	04	4	4
50	80	5	05	5	5
60	96	6	06	6	6

- n4 specifies Watermark brightness and recommended value is 0x20.
- n5 specifies number of bitmap in Flash (Defined by **FS q**).

[Note]

• This command should be used at the beginning of the line, otherwise it is not effective.
• This command is only effective in line mode and not effective in page mode.

- Please use **FS q** to define the bitmap before using this command.

[Example] 1D 7B 77 02 01 00 22 40 01

Explanation:

n1=0x01; Print watermark when print start
n2=0x00; Align to left side
n3=0x22; Double width and double height
n4=0x40; Watermark brightness is 0x40
n1=0x01; Use the number 1 bitmap in Flash as watermark image

3 Programming Process Guide

Because the different printing status and error can be transmitted by Auto Status Back (ASB) command, it is recommended that you can use ASB command to inquiry status. ASB command is effective when power on the printer and can be directly sent to inquiry the status.

The recommended programming process is shown as below:

1) Inquiry the printer status

Make sure that the printer status is normal before sending data to print.

2) Initialize the printer

Make sure that the previous setting does not affect the current printing.

3) Setup the print content

Setup the print content such as character property, bitmap property and barcode property etc for the needed printing effect.

4) Send the data for printing (including the setup command before printing)

If the printing data is bitmap data, please do not send the status inquiry command before sending printing data.

5) Inquiry the printer status after printing

If ASB is enabled, the printer will return the printer status automatically.

Appendix

Appendix A: Code128 Bar Code

A.1 Description of the CODE128 Bar Code

In CODE128 bar code system, it is possible to represent 128 ASCII characters and 2-digit numerals using one bar code character that is defined by combining one of the 103 bar code characters and 3 code sets. Each code set is used for representing the following characters:

- Code set A: ASCII characters 00H to 5FH
- Code set B: ASCII characters 20H to 7FH
- Code set C: 2-digit numeral characters using one character (100 numerals from 00 to

99)

The following special characters are also available in CODE128:

- SHIFT characters

In code set A, the character just after SHIFT is processed as a character for code set B. In code set B, the character just after SHIFT is processed as a character for code set A.

SHIFT characters cannot be used in code set C.

- Code set selection character (CODE A, CODE B, CODE C).

This character switches the following code set to code set A, B, or C.

- Function character (FNC1, FNC2, FNC3, FNC4)

The usage of function characters depends on the application software. In code set C, only FNC1 is available.

A.2 Code Tables

Printable characters in code set A

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
NULL	00	0	(	28	40	P	50	80
SOH	01	1	)	29	41	Q	51	81
STX	02	2	*	2A	42	R	52	82
ETX	03	3	+	2B	43	S	53	83
EOT	04	4	,	2C	44	T	54	84
ENQ	05	5	-	2D	45	U	55	85
ACK	06	6	.	2E	46	V	56	86
BEL	07	7	/	2F	47	W	57	87
BS	08	8	0	30	48	X	58	88
HT	09	9	1	31	49	Y	59	89
LF	0A	10	2	32	50	Z	5A	90
VT	0B	11	3	33	51	[	5B	91
FF	0C	12	4	34	52	\	5C	92
CR	0D	13	5	35	53	]	5D	93
SO	0E	14	6	36	54	^	5E	94
SI	0F	15	7	37	55	_	5F	95
DLE	10	16	8	38	56	FNC1	7B,31	123,49
DC1	11	17	9	39	57	FNC2	7B,32	123,50
DC2	12	18	:	3A	58	FNC3	7B,33	123,51
DC3	13	19	;	3B	59	FNC4	7B,34	123,52
DC4	14	20	<	3C	60	SHIFT	7B,53	123,83
NAK	15	21	=	3D	61	CODEB	7B,42	123,66
SYN	16	22	>	3E	62	CODEC	7B,43	123,67
ETB	17	23	?	3F	63			
CAN	18	24	@	40	64			
EM	19	25	A	41	65			
SUB	1A	26	B	42	66			
ESC	1B	27	C	43	67			
FS	1C	28	D	44	68			
GS	1D	29	E	45	69			
RS	1E	30	F	46	70			
US	1F	31	G	47	71			
SP	20	32	H	48	72			
!	21	33	I	49	73			
"	22	34	J	4A	74			
#	23	35	K	4B	75			
\$	24	36	L	4C	76			
%	25	37	M	4D	77			
&	26	38	N	4E	78			
'	27	39	O	4F	79			

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Printable characters in code set B

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
SP	20	32	H	48	72	p	70	112
!	21	33	I	49	73	q	71	113
"	22	34	J	4A	74	r	72	114
#	23	35	K	4B	75	s	73	115
\$	24	36	L	4C	76	t	74	116
%	25	37	M	4D	77	u	75	117
&	26	38	N	4E	78	v	76	118
'	27	39	O	4F	79	w	77	119
(	28	40	P	50	80	x	78	120
)	29	41	Q	51	81	y	79	121
*	2A	42	R	52	82	z	7A	122
+	2B	43	S	53	83	{	7B,7B	123,123
,	2C	44	T	54	84	|	7C	124
-	2D	45	U	55	85	}	7D	125
.	2E	46	V	56	86	—	7E	126
/	2F	47	W	57	87	DEL	7F	127
0	30	48	X	58	88	FNC1	7B,31	123,49
1	31	49	Y	59	89	FNC2	7B,32	123,50
2	32	50	Z	5A	90	FNC3	7B,33	123,51
3	33	51	[	5B	91	FNC4	7B,34	123,52
4	34	52	\	5C	92	SHIFT	7B,53	123,83
5	35	53	]	5D	93	CODEA	7B,41	123,65
6	36	54	^	5E	94	CODEC	7B,43	123,67
7	37	55	~	5F	95			
8	38	56		60	96			
9	39	57	a	61	97			
:	3A	58	b	62	98			
;	3B	59	c	63	99			
<	3C	60	d	64	100			
=	3D	61	e	65	101			
>	3E	62	f	66	102			
?	3F	63	g	67	103			
@	40	64	h	68	104			
A	41	65	i	69	105			
B	42	66	j	6A	106			
C	43	67	k	6B	107			
D	44	68	l	6C	108			
E	45	69	m	6D	109			
F	46	70	n	6E	110			
G	47	71	o	6F	111			

Printable characters in code set C

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
0	00	0	40	28	40	80	50	80
1	01	1	41	29	41	81	51	81
2	02	2	42	2A	42	82	52	82
3	03	3	43	2B	43	83	53	83
4	04	4	44	2C	44	84	54	84
5	05	5	45	2D	45	85	55	85
6	06	6	46	2E	46	86	56	86
7	07	7	47	2F	47	87	57	87
8	08	8	48	30	48	88	58	88
9	09	9	49	31	49	89	59	89
10	0A	10	50	32	50	90	5A	90
11	0B	11	51	33	51	91	5B	91
12	0C	12	52	34	52	92	5C	92
13	0D	13	53	35	53	93	5D	93
14	0E	14	54	36	54	94	5E	94
15	0F	15	55	37	55	95	5F	95
16	10	16	56	38	56	96	60	96
17	11	17	57	39	57	97	61	97
18	12	18	58	3A	58	98	62	98
19	13	19	59	3B	59	99	63	99
20	14	20	60	3C	60	FNC1 CODEA CODEB	7B,31	123,49
21	15	21	61	3D	61		7B,41	123,65
22	16	22	62	3E	62		7B,42	123,66
23	17	23	63	3F	63			
24	18	24	64	40	64			
25	19	25	65	41	65			
26	1A	26	66	42	66			
27	1B	27	67	43	67			
28	1C	28	68	44	68			
29	1D	29	69	45	69			
30	1E	30	70	46	70			
31	1F	31	71	47	71			
32	20	32	72	48	72			
33	21	33	73	49	73			
34	22	34	74	4A	74			
35	23	35	75	4B	75			
36	24	36	76	4C	76			
37	25	37	77	4D	77			
38	26	38	78	4E	78			
39	27	39	79	4F	79			

Appendix B: Print mode and its change

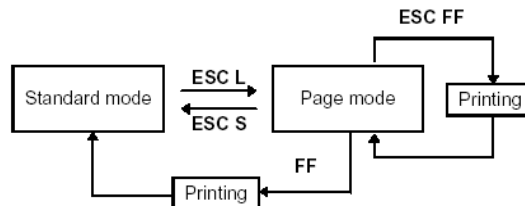
B.1 General Description

The printer operates in two print modes only when the paper roll is selected as the print sheet: standard mode and page mode. In standard mode, the printer prints and feeds paper each time it receives print data or paper feed commands. In page mode, all the received print data and paper feed commands are processed in the specified memory, and the printer executes no operations. All the data in the memory is then printed when an **ESC FF** or **FF** command is received.

For example, when the printer receives the data "ABCDEF" <LF> in standard mode, it prints "ABCDEF" and feeds the paper by one line. In page mode, "ABCDEF" is written to

the specified printing area in memory, and the position in memory for the next print data is shifted by one line.

The **ESC L** command puts the printer into page mode, and all commands received thereafter are processed in page mode. Executing an **ESC FF** command prints the received data collectively, and executing an **FF** command restores the printer to standard mode after the received data is printed collectively. Executing an **ESC S** command restores the printer to standard mode without printing the received data in page mode; the received data is cleared from memory instead.



Shifting Between Standard Mode and Page Mode

B.2 Setting Values in Standard and Page Modes

1) The available commands and parameters are the same for both standard and page modes. However, these values can be set independently in each mode for the **ESC SP**, **ESC 2**, **ESC 3**, and **FS S** commands. For these commands, different settings can be stored for each mode.

B.3 Formatting of Print Data in the Printable Area

Formatting of print data in the printable area is performed as follows:

1) The printable area is set using **ESC W**. If all printing and feeding are complete before the printer receives the **ESC W** command, the left side (as you face the printer) is taken as the origin (x0, y0) of the printable area. The printable rectangular area is defined by the length (dx dots) extending from and including the origin (x0, y0) in the x direction (perpendicular to the paper feed direction), and by the length (dy dots) in the y direction (paper feed direction). (If the **ESC W** command is not used, the printable area remains the default value.)

2) When the printer receives print data after **ESC W** sets the printable area and **ESC T** sets the printing direction, the print data is formatted within the printable area so that point A in Figure B.2 is at the beginning of the printable area as a default value. (When a character is printed, point A is the baseline.)

Print data containing downloaded bit images or bar codes is formatted so that the bottom point of the left side of the image data (point B in Figure B.3) is aligned with the baseline. However, any Human Readable Interpretation (HRI) characters are printed under the baseline. At the points labeled Point B, if characters (such as double-height characters) higher than normal size characters or downloaded bit image characters are received, any part of the character higher than the normal-size character is not printed.

3) If the print data (including the space to the right of a character) exceeds the printable area before the printer receives a command (e.g., **LF** or **ESC J**) that includes line feeding, a line feed is executed automatically within the printable area. The print position, therefore, moves to the beginning of the next line. The line feed amount depends on the values set by commands (such as **ESC 2** and **ESC 3**).

4) The default value of the line spacing is set to 1/6 inch and corresponds to 31 dots in the vertical direction. If print data for the next line contains extended characters that are higher than double-height characters, bit images taking up two or more lines, or bar codes higher than normal characters, the amount of line feeding may be insufficient, resulting in overlapping of the characters' higher-order dots with the previous line. To avoid this, increase the amount of line spacing.

Example

When printing a downloaded bit image of six bytes in the vertical direction, use the following formula:

{number of vertical dots (8×6) - number of dots for feeding at the beginning of the printable area (24)} × vertical motion unit conversions (180/180) = 24

Therefore, 24 dots are required for feeding.

Use the following commands:

ESC W xL, xH, yL, yH, dxL, dxH, dyL, dyH

ESC T n

ESC 3 24 → Set line spacing to be added.

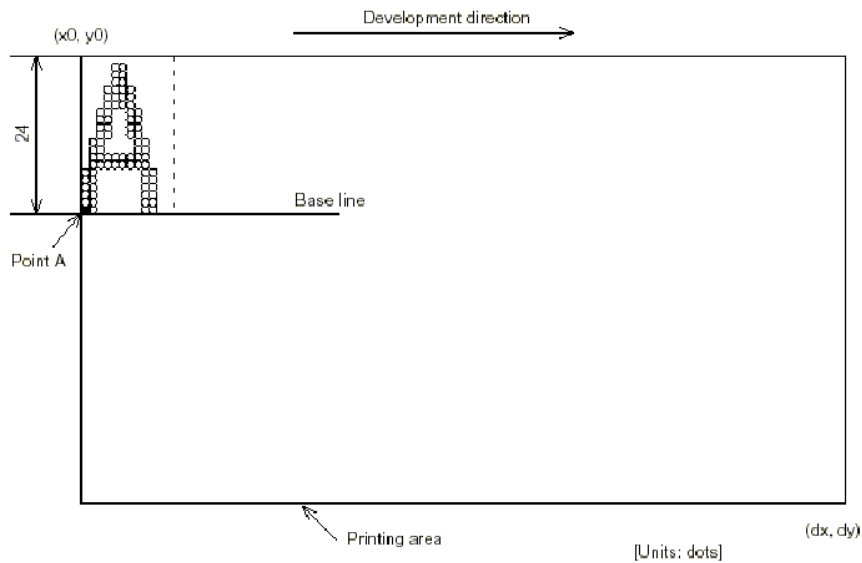
LF

GS / 1

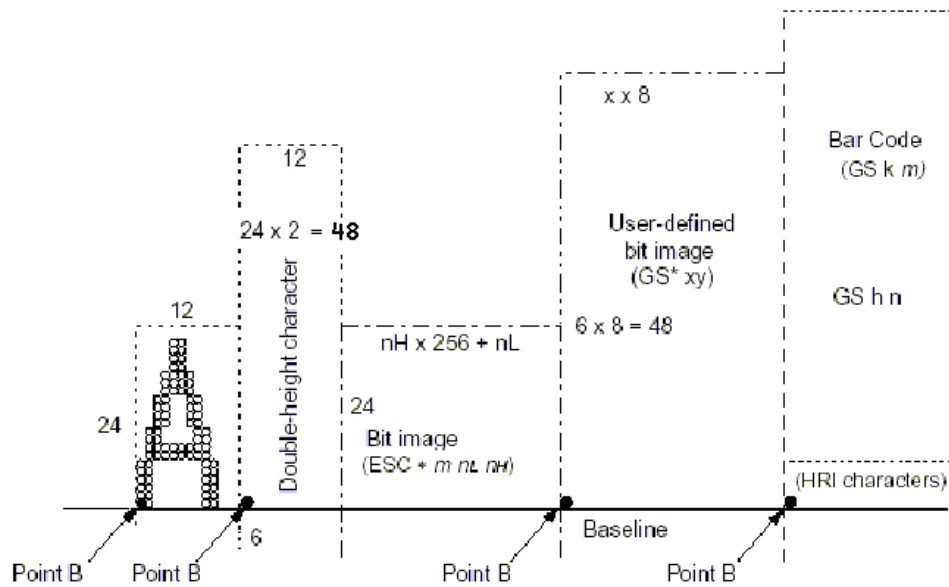
ESC 2 → Reset the line spacing to 1/6 inch.

NOTE: Vertical and horizontal motion units are 1/180 in the vertical direction and 1/203 in the horizontal direction; therefore, the position you specify varies depending on the printing direction. Setting the vertical motion unit to 1/180 using the **GS P** command does not change the current print position.

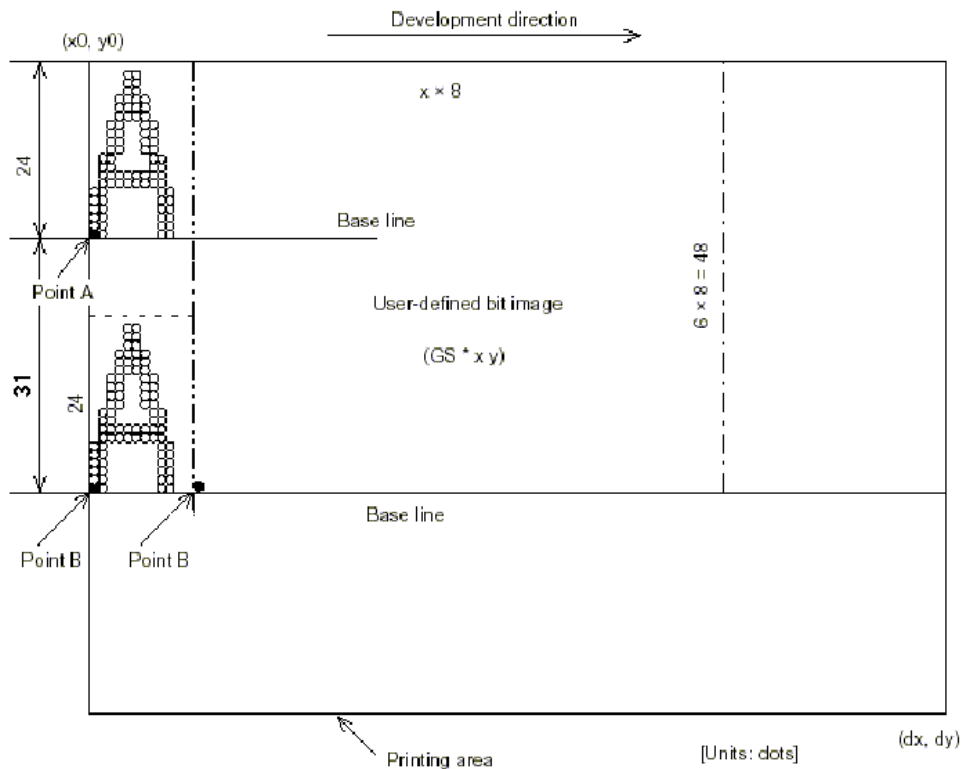
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Character Data Developing Position



Print Data Developing Position



Downloaded Bit Image Developing Position

Appendix C: Control Sequences & Code Page Fonts

The control sequences of the printer controller are POS compatible.

Code	Hex	Dec	Function
HT	09	09	Horizontal tab
LF	0A	10	Print and line feed
FF	0C	12	Print and return to standard mode (in page mode)
CR	0D	13	Print and carriage return
CAN	18	24	Cancel print data in page mode
DLE EOT	10 04	16 04	Real-time status transmission
DLE ENQ	10 05	16 05	Real-time request to printer
DLE DC4	10 14	16 20	Generate pulse at real-time
ESC FF	1B 0C	27 12	Print data in page mode
ESC SP	1B 20	27 32	Set right-side character spacing
ESC !	1B 21	27 33	Select print mode(s)
ESC #	1B 23	27 35	Specify a number for the bit-image to be downloaded
ESC \$	1B 24	27 36	Set absolute print position
ESC %	1B 25	27 37	Select/cancel user-defined character set
ESC &	1B 26	27 38	Define user-defined characters
ESC *	1B 2A	27 42	Select bit-image mode
ESC -n	1B 2D	27 45	Turn underline mode on/off
ESC 2	1B 32	27 50	Select default line spacing
ESC 3	1B 33	27 51	Set line spacing
ESC =	1B 3D	27 61 n	Select peripheral device
ESC ?	1B 3F	27 63 n	Cancel user-defined characters
ESC @	1B 40	27 64	Initialize printer
ESC D	1B 44	27 68	Set horizontal tab positions
ESC E	1B 45	27 69	Turn emphasized mode on/off
ESC G	1B 47	27 71	Turn double-strike mode on/off
ESC J	1B 4A	27 74 n	Print and feed paper
ESC L	1B 4C	27 76	Select page mode
ESC M	1B 4D	27 77	Select character font
ESC R	1B 52	27 82	Select an international character set
ESC S	1B 53	27 83	Select standard mode
ESC T	1B 54	27 84	Select print direction in page mode
ESC V	1B 56	27 86	Turn 90° clockwise rotation mode on/off
ESC W	1B 57	27 87	Set printing area in page mode
ESC \	1B 5C	27 92	Set relative print position
ESC a	1B 61	27 97	Select justification
ESC c 0	1B 63 30	27 99 48	Selects the paper type
ESC c 3	1B 63 33	27 99 51	Select paper sensor(s) to output paper-end signals
ESC c 4	1B 63 34	27 99 52	Select paper sensor(s) to stop printing
ESC c 5	1B 63 35	27 99 53	Enable/disable panel buttons
ESC d	1B 64	27 100	Print and feed n lines
ESC p	1B 70	27 112	General pulse

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ESC t	1B 74	27 116	Selects character code table
ESC {	1B 7B	27 123	Select character code table
FS p	1C 70	28 112	Print NV bit image
FS q	1C 71	28 113	Define NV bit image
GS !	1D 21	29 33	Select character size
GS \$	1D 24	29 36	Set absolute vertical print position in page mode
GS *	1D 2A	29 42	Define downloaded bit image
GS (A	1D 28 41	29 40 65	Execute test print
GS /	1D 2F	29 47	Print downloaded bit image
GS :	1D 3A	29 58	Start/end macro definition
GS B	1D 42	29 66	Turn white/black reverse printing mode on/off
GS H	1D 48	29 72	Select printing position of HRI characters
GS I	1D 47	29 73	Transmit printer ID
GS L	1D 4C	29 76	Set left margin
GS P	1D 50	29 80	Set horizontal and vertical motion units
GS V	1D 56	29 86	Select cut mode and cut paper
GS W	1D 57	29 87	Set printing area width
GS \	1D 5C	29 92	Set relative vertical print position in page mode
GS ^	1D 5E	29 94	Execute macro
GS a	1D 61	29 97	Enable/disable Automatic Status Back (ASB)
GS f	1D 66	29 102	Select font for HRI characters
GS h	1D 68	29 104	Set bar code height
GS k	1D 6B	29 107	Print bar code
GS p	1D 70	29 112	Set barcode parameter of barcode PDF417
GS q	1D 71	29 113	Set correction grade of barcode PDF417
GS r	1D 72	29 114	Transmit status
GS v 0	1D 76 30	19 118 48	Print raster bit image
GS w	1D 77	29 119	Set bar code width
GS { w	1D 7B 77	29 123 119	Enable/Disable Water mark Function
GS { w f	1D 7B 77 02	29 123 119 02	Setting Watermark parameter
FS !	1C 21	28 33	Set print mode(s) for Kanji characters
FS &	1C 26	28 38	Select Kanji character mode
FS -	1C 2D	28 45	Turn underline mode on/off for Kanji characters
FS .	1C 2E	28 46	Cancel Kanji character mode
FS2	1C 32	28 50	Define user-defined Kanji characters
FS S	1C 53	28 83	Set Kanji character spacing
FS W	1C 57	28 87	Turn quadruple-size mode on/off for Kanji characters

HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
HEX BIN	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	NUL	DLE	SP	0	@	P	,	p	Ç	É	â	176	192	208	224	240
1	0001	XON	!	1	A	Q	a	q	ü	æ	í	177	193	209	225	241
2	0010		"	2	B	R	b	r	é	Æ	ó	178	194	210	226	242
3	0011	XOFF	#	3	C	S	c	s	â	ô	ú	179	195	211	227	243
4	0100	EOT	\$	4	D	T	d	t	ä	ö	ñ	180	196	212	228	244
5	0101	ENQ	%	5	E	U	e	u	à	ò	Ñ	181	197	213	229	245
6	0110		&	6	F	V	f	v	á	û	ä	182	198	214	230	246
7	0111		,	7	G	W	g	w	ç	ù	ö	183	199	215	231	247
8	1000	BS	(	8	H	X	h	x	ê	ý	ú	184	200	216	232	248
9	1001	HT	)	9	I	Y	i	y	ë	ÿ	û	185	201	217	233	249
A	1010	LF	*	:	J	Z	j	z	è	Û	ü	186	202	218	234	250
B	1011	ESC	+	;	K	[	k	|	ï	φ	½	187	203	219	235	251
C	1100	FF	,	<	L	\	l	!	î	£	†	188	204	220	236	252
D	1101	CR	-	=	M]	m		ì	¥	¡	189	205	221	237	253
E	1110		.	>	N	^	n	~	Ä	¥	«	190	206	222	238	254
F	1111		/	?	O	_	o	SP	Å	f	»	191	207	223	239	255

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PC850: Multilingual

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	176	Ł 192	Š 208	Ó 224	— 240
1	0001	ü 129	æ 145	í 161	177	Ł 193	Đ 209	β 225	± 241
2	0010	é 130	Æ 146	ó 162	178	Ŧ 194	Ê 210	Ô 226	— 242
3	0011	â 131	ô 147	ú 163	179	Ƨ 195	Ë 211	Ò 227	¾ 243
4	0100	ä 132	ö 148	ñ 164	180	— 196	È 212	Ö 228	¶ 244
5	0101	à 133	ò 149	Ñ 165	Á 181	† 197	ı 213	Õ 229	§ 245
6	0110	â 134	û 150	ä 166	Â 182	ã 198	í 214	μ 230	÷ 246
7	0111	ç 135	ù 151	ó 167	À 183	Ã 199	î 215	þ 231	ˆ 247
8	1000	ê 136	ÿ 152	¿ 168	© 184	Ł 200	İ 216	Ɔ 232	° 248
9	1001	ë 137	ÿ 153	® 169	Ǝ 185	ŕ 201	Ɔ 217	Ú 233	˚ 249
A	1010	è 138	Û 154	¬ 170	ı 186	Ł 202	ŕ 218	Û 234	˙ 250
B	1011	ï 139	ø 155	½ 171	Ǝ 187	Ŧ 203	■ 219	Ü 235	¹ 251
C	1100	î 140	£ 156	¼ 172	Ǝ 188	Ƨ 204	■ 220	Ý 236	³ 252
D	1101	ì 141	Ø 157	ı 173	¢ 189	— 205	ı 221	Ý 237	² 253
E	1110	Ä 142	× 158	« 174	¥ 190	† 206	İ 222	— 238	■ 254
F	1111	Å 143	ƒ 159	» 175	Ǝ 191	¤ 207	■ 223	’ 239	SP 255

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PC852 Latin2

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	16	32	0	@	P	,	p	Ç	É	á	⋮	Ł	ð	Ó	–
01	11	21	31	41	51	61	71	81	91	A1	B1	C1	D1	E1	F1
1	17	33	!	1	A	Q	a	q	ü	Í	í	⌚	Ð	ß	”
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2
2	18	34	"	2	B	R	b	r	é	Í	ó	⌚	Đ	Ô	‘
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3
3	19	35	#	3	C	S	c	s	â	ô	ú	⌚	Ě	Ň	ˇ
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4
4	20	36	\$	4	D	T	d	t	ä	ö	À	⌚	–	đ	ñ
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5
5	21	37	%	5	E	U	e	u	ű	Ľ	ą	À	⌚	Ń	ň
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6
6	22	38	&	6	F	V	f	v	ć	İ	Ž	À	İ	Š	÷
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7
7	23	39	'	7	G	W	g	w	ç	Ś	ž	Ě	ă	Î	ș
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8
8	24	40	(	8	H	X	h	x	ı	ś	Ę	Ş	Ł	ě	Ŕ
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9
9	25	41	)	9	I	Y	i	y	ë	Ö	ę	⌚	⌚	Ú	”
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA
10	26	42	*	:	J	Z	j	z	Ő	Ü	⌚	⌚	⌚	ı	•
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB
11	27	43	+	;	K	[	k	{	ó	Ť	ž	⌚	⌚	Ú	ú
0C	1C	2C	3C	4C	5C	6C	7C	8C	9C	AC	BC	CC	DC	EC	FC
12	28	44	,	<	L	\	l	|	î	ť	Č	⌚	■	ý	Ř
0D	1D	2D	3D	4D	5D	6D	7D	8D	9D	AD	BD	CD	DD	ED	FD
13	29	45	-	=	M	]	m	}	Ž	Ł	ş	Ž	=	Ţ	Ÿ
0E	1E	2E	3E	4E	5E	6E	7E	8E	9E	AE	BE	CE	DE	EE	FE
14	30	46	.	>	N	^	n	~	Ă	×	«	Ž	⌚	Ů	ť
0F	1F	2F	3F	4F	5F	6F	7F	8F	9F	AF	BF	CF	DF	EF	FF
15	31	47	/	?	O	_	o	Δ	Ć	č	»	⌚	⌚	’	

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PC858

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	16	32	0	@	P	`	p	Ç	É	á	⋮	L	ð	Ó	-
01	11	21	31	41	51	61	71	81	91	A1	B1	C1	D1	E1	F1
1	17	33	!	1	A	Q	a	q	ü	æ	í	⌚	⊥	Ð	±
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2
2	18	34	"	2	B	R	b	r	é	Æ	ó	⌚	⊥	Ê	—
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3
3	19	35	#	3	C	S	c	s	â	ô	ú	⌚	⊥	Ë	¾
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4
4	20	36	\$	4	D	T	d	t	ä	ö	ñ	⌚	⊥	È	¶
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5
5	21	37	%	5	E	U	e	u	à	ò	Ñ	Á	+	€	§
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6
6	22	38	&	6	F	V	f	v	â	û	ª	Â	ã	Í	÷
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7
7	23	39	'	7	G	W	g	w	ç	ù	º	À	Ã	Î	¿
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8
8	24	40	(	8	H	X	h	x	ê	ÿ	¿	©	ℓ	Ï	°
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9
9	25	41	)	9	I	Y	i	y	ë	Ö	®	⌚	⊥	Ú	²
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA
10	26	42	*	:	J	Z	j	z	è	Ü	¬	||	⌚	Û	³
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB
11	27	43	+	;	K	[	k	{	ï	ø	½	⌚	⊥	Ü	¹
0C	1C	2C	3C	4C	5C	6C	7C	8C	9C	AC	BC	CC	DC	EC	FC
12	28	44	,	<	L	\	|	|	î	£	¼	⌚	⊥	Ý	³
0D	1D	2D	3D	4D	5D	6D	7D	8D	9D	AD	BD	CD	DD	ED	FD
13	29	45	-	=	M	]	m	}	ì	Ø	¡	¢	=	ÿ	²
0E	1E	2E	3E	4E	5E	6E	7E	8E	9E	AE	BE	CE	DE	EE	FE
14	30	46	.	>	N	^	n	~	Ä	×	«	¥	⌚	ÿ	²
0F	1F	2F	3F	4F	5F	6F	7F	8F	9F	AF	BF	CF	DF	EF	FF
15	31	47	/	?	O	_	o	△	Å	f	»	⌚	⊥	ÿ	²

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	☒ 176	Ł 192	⌞ 208	α 224	≡ 240
1	0001	ü 129	À 145	í 161	☒ 177	⌞ 193	⌞ 209	β 225	± 241
2	0010	é 130	È 146	ó 162	☒ 178	⌞ 194	⌞ 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	⌞ 179	⌞ 195	⌞ 211	π 227	≤ 243
4	0100	ã 132	õ 148	ñ 164	⌞ 180	⌞ 196	⌞ 212	Σ 228	ƒ 244
5	0101	à 133	ò 149	Ñ 165	⌞ 181	⌞ 197	⌞ 213	σ 229	ƒ 245
6	0110	Á 134	Ú 150	ä 166	⌞ 182	⌞ 198	⌞ 214	μ 230	÷ 246
7	0111	ç 135	ù 151	ó 167	⌞ 183	⌞ 199	⌞ 215	τ 231	≈ 247
8	1000	ê 136	î 152	¿ 168	⌞ 184	⌞ 200	⌞ 216	Φ 232	° 248
9	1001	Ê 137	Ï 153	Ò 169	⌞ 185	⌞ 201	⌞ 217	Θ 233	• 249
A	1010	è 138	Û 154	ˆ 170	⌞ 186	⌞ 202	⌞ 218	Ω 234	• 250
B	1011	Í 139	Φ 155	½ 171	⌞ 187	⌞ 203	⌞ 219	δ 235	√ 251
C	1100	Ô 140	£ 156	¼ 172	⌞ 188	⌞ 204	⌞ 220	∞ 236	n 252
D	1101	ì 141	Û 157	ı 173	⌞ 189	⌞ 205	⌞ 221	ø 237	z 253
E	1110	Ã 142	Pl 158	« 174	⌞ 190	⌞ 206	⌞ 222	€ 238	■ 254
F	1111	Â 143	Ó 159	» 175	⌞ 191	⌞ 207	⌞ 223	∩ 239	SP 255

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PC863: Canadian-French

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	Ì 160	Ï 176	Ì 192	Í 208	α 224	≡ 240
1	0001	ü 129	È 145	Í 161	Î 177	Î 193	Ï 209	β 225	± 241
2	0010	é 130	Ê 146	Ó 162	Ô 178	Ô 194	Õ 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	û 179	û 195	ü 211	π 227	≤ 243
4	0100	Â 132	Ë 148	“ 164	” 180	— 196	Û 212	Σ 228	ƒ 244
5	0101	à 133	ï 149	„ 165	‡ 181	† 197	Ů 213	σ 229	ƒ 245
6	0110	¶ 134	û 150	³ 166	‡ 182	† 198	Ů 214	μ 230	÷ 246
7	0111	ç 135	ù 151	— 167	‡ 183	† 199	Ů 215	τ 231	≈ 247
8	1000	ê 136	ϣ 152	İ 168	ƒ 184	ℓ 200	† 216	Φ 232	° 248
9	1001	ë 137	ö 153	ı 169	‡ 185	† 201	Ů 217	θ 233	• 249
A	1010	è 138	Û 154	ı 170	‡ 186	† 202	Ů 218	Ω 234	· 250
B	1011	ï 139	ϣ 155	½ 171	ƒ 187	ℓ 203	■ 219	δ 235	√ 251
C	1100	î 140	£ 156	¼ 172	ƒ 188	ℓ 204	■ 220	∞ 236	n 252
D	1101	— 141	Û 157	¾ 173	ƒ 189	ℓ 205	■ 221	∅ 237	² 253
E	1110	À 142	Ů 158	« 174	ƒ 190	ℓ 206	■ 222	€ 238	■ 254
F	1111	§ 143	ƒ 159	» 175	ƒ 191	ℓ 207	■ 223	∩ 239	SP 255

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	176	Ł 192	Ł 208	α 224	≡ 240
1	0001	ü 129	æ 145	í 161	177	Ł 193	Ŧ 209	β 225	± 241
2	0010	é 130	Æ 146	ó 162	178	Ŧ 194	Ŧ 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	ł 179	ł 195	Ł 211	π 227	≤ 243
4	0100	ä 132	ö 148	ñ 164	ł 180	Ł 196	Ł 212	Σ 228	ƒ 244
5	0101	à 133	ò 149	Ñ 165	ł 181	Ł 197	Ŧ 213	σ 229	Ƶ 245
6	0110	å 134	û 150	ä 166	ł 182	Ł 198	Ŧ 214	μ 230	÷ 246
7	0111	ç 135	ù 151	ó 167	ł 183	Ł 199	Ł 215	τ 231	≈ 247
8	1000	ê 136	ÿ 152	¿ 168	ł 184	Ł 200	Ł 216	Φ 232	° 248
9	1001	ë 137	Ö 153	ƒ 169	ł 185	Ł 201	Ł 217	Θ 233	• 249
A	1010	è 138	Û 154	ƒ 170	ł 186	Ł 202	Ŧ 218	Ω 234	• 250
B	1011	ï 139	ø 155	½ 171	ł 187	Ŧ 203	219	δ 235	√ 251
C	1100	î 140	£ 156	¼ 172	ł 188	Ł 204	220	∞ 236	n 252
D	1101	ì 141	Ø 157	ı 173	ł 189	Ł 205	221	∅ 237	² 253
E	1110	Ä 142	Ɔ 158	« 174	ł 190	Ł 206	222	€ 238	■ 254
F	1111	Å 143	ƒ 159	Ɔ 175	ł 191	Ł 207	223	∩ 239	SP 255

PC866: Cyrillic #2

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	А 128	Р 144	а 160	Ѡ 176	Љ 192	Ў 208	р 224	Ѣ 240
1	0001	Б 129	С 145	б 161	ѡ 177	Ї 193	Ѹ 209	с 225	ѣ 241
2	0010	В 130	Т 146	в 162	Ѣ 178	Љ 194	Ѹ 210	т 226	Є 242
3	0011	Г 131	У 147	г 163	ѣ 179	Ї 195	Ў 211	у 227	є 243
4	0100	Д 132	Ф 148	д 164	Ѥ 180	Ї 196	Ў 212	ф 228	ї 244
5	0101	Е 133	Х 149	е 165	ѥ 181	Ї 197	Ў 213	х 229	і 245
6	0110	Ж 134	Ц 150	ж 166	Ѧ 182	Ї 198	Ў 214	ц 230	ѷ 246
7	0111	З 135	Ч 151	з 167	ѧ 183	Ї 199	Ў 215	ч 231	ѹ 247
8	1000	И 136	Ш 152	и 168	Ѩ 184	Ї 200	Ў 216	ш 232	° 248
9	1001	Й 137	Щ 153	й 169	ѩ 185	Ї 201	Ў 217	щ 233	° 249
A	1010	К 138	Ъ 154	к 170	Ѫ 186	Ї 202	Ў 218	ъ 234	° 250
B	1011	Л 139	Ы 155	л 171	ѫ 187	Ї 203	Ў 219	ы 235	✓ 251
C	1100	М 140	Ь 156	м 172	Ѭ 188	Ї 204	Ў 220	ь 236	№ 252
D	1101	Н 141	Э 157	н 173	ѭ 189	Ї 205	Ў 221	э 237	□ 253
E	1110	О 142	Ю 158	о 174	Ѯ 190	Ї 206	Ў 222	ю 238	■ 254
F	1111	П 143	Я 159	п 175	ѯ 191	Ї 207	Ў 223	я 239	SP 255

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	€ 128	SP 144	SP 160	° 176	À 192	Ð 208	à 224	ð 240
1	0001	SP 129	' 145	í 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	0010	, 130	, 146	¢ 162	² 178	Â 194	Ò 210	â 226	ò 242
3	0011	f 131	" 147	£ 163	³ 179	Ã 195	Ó 211	ã 227	ó 243
4	0100	" 132	" 148	¤ 164	´ 180	Ä 196	Ô 212	ä 228	ô 244
5	0101	... 133	· 149	¥ 165	µ 181	Å 197	Õ 213	å 229	ö 245
6	0110	† 134	– 150	¡ 166	¶ 182	Æ 198	Ö 214	æ 230	ö 246
7	0111	‡ 135	— 151	§ 167	· 183	Ç 199	× 215	ç 231	+ 247
8	1000	ˆ 136	ˆ 152	¨ 168	˙ 184	È 200	Ø 216	è 232	ø 248
9	1001	‰ 137	™ 153	© 169	¹ 185	É 201	Ù 217	é 233	ù 249
A	1010	Š 138	š 154	ª 170	º 186	Ê 202	Ú 218	ê 234	ú 250
B	1011	‘ 139	’ 155	« 171	» 187	Ë 203	Û 219	ë 235	û 251
C	1100	Œ 140	œ 156	¬ 172	¼ 188	Ì 204	Ü 220	ì 236	ü 252
D	1101	SP 141	SP 157	· 173	½ 189	Í 205	Ý 221	í 237	ý 253
E	1110	Ž 142	ž 158	® 174	¾ 190	Î 206	Þ 222	î 238	þ 254
F	1111	SP 143	ÿ 159	— 175	¿ 191	Ï 207	ß 223	ï 239	ÿ 255

Katakana

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	ー	⊥	SP	ー	タ	ミ	二	×
		128	144	160	176	192	208	224	240
1	0001	ー	⊥	。	ア	チ	ム	ト	円
		129	145	161	177	193	209	225	241
2	0010	ー	⊥	「	イ	ツ	メ	キ	年
		130	146	162	178	194	210	226	242
3	0011	ー	ト	」	ウ	テ	モ	コ	月
		131	147	163	179	195	211	227	243
4	0100	■	ー	、	エ	ト	ヤ	▲	日
		132	148	164	180	196	212	228	244
5	0101	■	ー	・	オ	ナ	ユ	▼	時
		133	149	165	181	197	213	229	245
6	0110	■	丨	ヲ	カ	ニ	ヨ	▼	分
		134	150	166	182	198	214	230	246
7	0111	■	丨	ア	キ	ヌ	ラ	▼	秒
		135	151	167	183	199	215	231	247
8	1000	丨	「	イ	ク	ネ	リ	♠	千
		136	152	168	184	200	216	232	248
9	1001	丨	「	ウ	ケ	ノ	ル	♥	市
		137	153	169	185	201	217	233	249
A	1010	丨	「	エ	コ	ハ	レ	♦	区
		138	154	170	186	202	218	234	250
B	1011	丨	「	オ	サ	ヒ	ロ	♣	町
		139	155	171	187	203	219	235	251
C	1100	■	「	ヤ	シ	フ	ワ	●	村
		140	156	172	188	204	220	236	252
D	1101	■	「	ユ	ス	ヘ	ン	○	人
		141	157	173	189	205	221	237	253
E	1110	■	「	ヨ	セ	ホ	。	/	国
		142	158	174	190	206	222	238	254
F	1111	+	ノ	ッ	ソ	マ	。	\	SP
		143	159	175	191	207	223	239	255

International Fonts

Country	ASCII code (Hex)											
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S.A	#	\$	@	[	\	\]	^	`	{	|	}	~
France	#	\$	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	\$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	\$	@	[	\	\]	^	`	{	|	}	~
Denmark I	#	\$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	\$	@	°	\	é	^	ù	à	ò	è	ì
Spain I	Pt	\$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
Japan	#	\$	@	[	¥	]	^	`	{	|	}	~
Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark II	#	\$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Spain II	#	\$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
Latin America	#	\$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
Korea	#	\$	@	[	₩	]	^	`	{	|	}	~